

## STATE OF NEW HAMPSHIRE

### TRANSFER STATION AND RECYCLING CENTER DESIGN AND OPERATIONS



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# **TRANSFER STATION AND RECYCLING CENTER DESIGN AND OPERATIONS**



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DES welcomes any comments or suggestions about the contents or format of this manual. As solid waste management is rapidly evolving with new ideas frequently appearing, we welcome any information that will make subsequent printings of this manual more accurate and useful.

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## INTRODUCTION

As a result of federal and state regulation, many of New Hampshire's communities have closed or are closing their unlined landfills and replacing them with transfer stations / recycling centers. This manual responds to a need expressed by these municipalities for practical information on the design, operating, and cost considerations involved in building and running a solid waste transfer station and recycling center. It expands on an earlier DES report, *Examples of New Hampshire Transfer Station / Recycling Center Costs* (April 1995), which provided case study cost and operating information from over a dozen facilities across the state. (This report is no longer available.)

The target audience for this document includes facility operators, solid waste managers, municipal officials, and solid waste and recycling committees. The manual works through the steps involved in planning, budgeting, and operating a transfer station / recycling center, as well as gaining support for the proposed new facility and solid waste management program from local residents. The manual can also serve as a reference to review the costs and operating efficiencies of existing transfer station / recycling centers.

The document is organized into three major sections: **The Plan, Costs, and Marketing The Plan:**

**The Plan** - Describes a series of closely interrelated considerations including **materials collected, site planning, building design, and operations** which directly affect the cost and efficiency of the proposed transfer station / recycling center. The design considerations are the foundation of the plan and should be examined closely for what is acceptable to the community in terms of capital and operating costs, materials collected, and ease of use.

**Costs** - Discusses the two major sets of costs to look at when planning a transfer station/recycling center: capital costs and operating costs.

**Marketing The Plan** - Provides information needed to gain the support of the community's residents, businesses, and civic groups for the new transfer and recycling center and proposed recycling and waste management program.

DES welcomes comments on this document, and will incorporate these into revisions that will be provided to all communities that receive the document. The Department would also like to emphasize that perhaps the most valuable information in New Hampshire on transfer station operations, recycling, and solid waste management is that which is traded among the state's communities through informal networking and sharing of experience. DES encourages all users of this document to seek out the expertise to be found in their neighboring communities. If this document does nothing more than stimulate such interaction among New Hampshire's communities, it will have served its purpose.

## THE PLAN

The major topics addressed in the plan include: **the materials you will collect** (including how they will be processed and marketed); **site planning and layout**; **building design**; and **operations**.

As you put together and review your plan, it is critical to remember that:

- The **PLAN** determines your **BUDGET**
- Your **BUDGET** has a major impact on your **PLAN**
- The **PLAN** and the **BUDGET** are what you **MARKET** to your residents
- What you can **MARKET** to residents largely defines both your **PLAN** and your **BUDGET**

In other words -

**YOU CANNOT SEPARATE PLANNING THE FACILITY, FROM THE COST OF THE FACILITY, FROM MARKETING THE PLAN TO THE RESIDENTS. ALL THREE MUST PROCEED TOGETHER, AND ALL THREE MUST BE OPEN TO CHANGE.**

**Who Should Develop the Plan?** The plan for your transfer station and recycling center and for your entire solid waste program should be developed with input from all parties with an interest in solid waste management and its cost to the community. This group should include representatives from the municipal department that will be responsible for construction and operation of the facility (typically public works), the local administration (select board or council), local businesses, citizen groups (e.g., taxpayers association, Chamber of Commerce, Rotary), and involved citizens (e.g., solid waste or recycling committee). The better community representation you have as you develop the plan, the greater the support you can expect when you take the plan to all of your citizens for approval at town meeting or a city council vote. In addition, by involving the broadest

possible group of citizens early in the planning process, you will flush out most objections to your plan, and be able to address them, incorporate them into your plan, or head them off before you come before a town meeting or public hearing.

**Waste Analysis.** One of the first steps the planning committee should undertake is an analysis of the quantity and composition of the materials that will be handled by the transfer station/recycling center. You need to know these numbers to make your plans for materials handling, processing, and storage, and to estimate the costs of handling and disposing of trash and recyclables. It's important to remember that this doesn't mean the total amount of trash and recyclables *generated* in the community, but the volume that will be received and handled by the transfer station, now and in the **future**. For example, if some residents contract with private haulers who transport their waste out of town, and you expect them to continue to do so, their waste and recyclables shouldn't be included in the analysis. The analysis should include the following materials: residential trash and recyclables, commercial/industrial trash and recyclables (if these will be handled at the transfer station), residential construction and demolition (C&D) wastes, commercial/industrial C&D wastes (if these will be handled by the facility), and automotive wastes (tires, used oil, and batteries).

There are several methods to develop this information, including: direct analysis of the materials disposed of by residents and businesses (this can be done by town employees, as a project by local students, or by a contracted consultant); review of data collected by other N.H. communities; or review of published literature on waste composition. (DES can provide assistance.) For communities located in tourist areas, the waste analysis should account for increases that occur during the tourist season.

**Unit-Based Pricing.** In the past few years, unit-based pricing (also known as “pay-per-bag”, “pay-as-you-throw”, or “variable rate pricing”) has received a great deal of interest in New Hampshire, and approximately three dozen communities have adopted it in some form. Much of this interest has been generated by tax property increases associated with landfill closure and the increasing cost of managing solid waste. Unit-based pricing

addresses these costs in three ways: 1) It takes some or all of the cost of solid waste management out of the tax rate; 2) It allows households to pay only for the services they use; and 3) It provides incentives to reduce costs by reducing waste generation and increasing composting, reuse, and recycling. DES encourages all N.H. municipalities to consider this waste management option.

Any municipality considering unit-based pricing should consult “*Variable Rate Pricing: A Practical Guide for Local Decisionmakers*” published by the Coalition of Northeastern Governors (and written primarily by DES staff), which is available from DES. The Governor’s Recycling Program (contact: Governor’s Recycling Program, 271-1098) can provide direct assistance in planning a unit-based program, and provide contacts from other N.H. municipalities that have implemented successful unit-based programs.

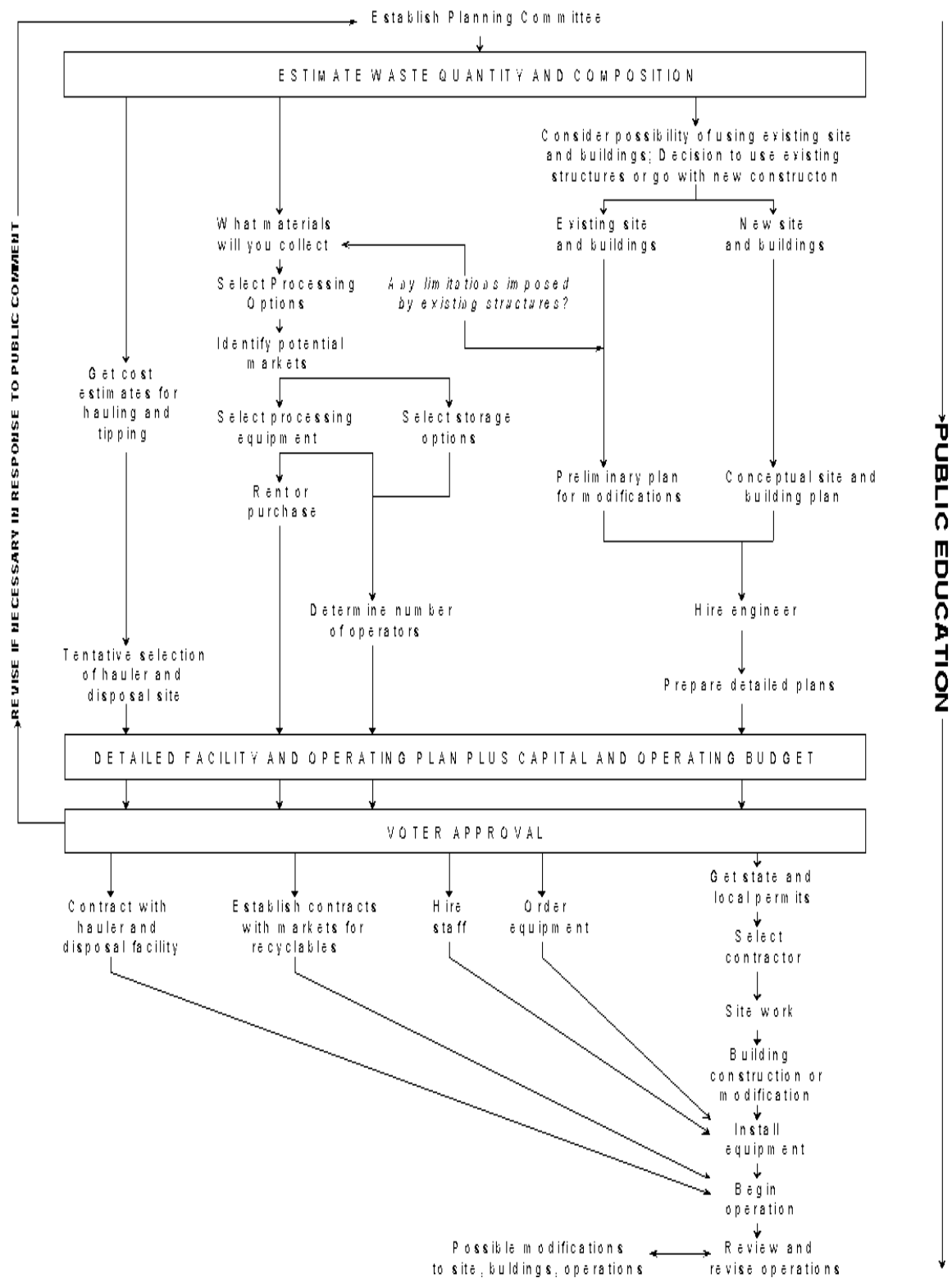
**Visiting Other Facilities.** It is impossible to overemphasize the importance of visiting other facilities as you work through plans for your own facility and operations. There is more to be learned from walking through other sites, watching their operations, and talking with their operators about operations, budgets, successes, and problems, than from any number of guidance manuals, workshops, or meetings on the subject.

The Department of Environmental Services can provide information on all of the transfer and recycling facilities in the state (contact: Planning and Community Assistance Section, 271-1749). The Governor’s Recycling Program maintains information on the state’s municipal recycling programs, including the buildings, equipment, and processing options used by each community (contact: 271-1098). The Northeast Resource Recovery Association (contact: 798-5777) can provide information for its members on recycling markets and review transfer station designs. Each organization can provide assistance in identifying communities and facilities that it might be most helpful to visit, including the names of contacts in each municipality.

**Planning Checklist.** Following this page is a checklist and diagram of all of the important steps you should follow as you plan, design facilities, and implement your transfer and

recycling program. Use this checklist to keep track of your planning and implementation activities, and to assure that you have completed all the steps necessary to bring a successful transfer and recycling program to your community.

**FIGURE 1**  
**STEPS IN PLANNING AND CONSTRUCTING A TRANSFER AND RECYCLING CENTER**



## CHECKLIST FOR PLANNING AND CONSTRUCTING A TRANSFER STATION/RECYCLING CENTER

### PRELIMINARY STEPS

Establish Planning Committee.

Develop and implement ongoing public education and outreach strategy.

Determine whether you will implement *unit-based pricing* ('pay-per-bag') as part of your solid waste management program. If yes, seek guidance on planning and implementing unit-based pricing as you work through transfer station and recycling plans. (See Coalition of Northeastern Governors document, "*Variable Rate Pricing: A Practical Guide for Local Decisionmakers*," available from DES.).

Determine amount of solid waste (including recyclables) that will be *handled* by the facility. (Check off which wastes/recyclables you plan to collect.).

Amount of residential nonrecyclable waste (trash).

Amount of residential recyclables.

Amount of commercial/industrial Waste.

Amount of residential C&D.

Amount of commercial C&D.

### MATERIALS

Consider which recyclables you will collect.

Do **Worksheet 1** to help make decisions about materials handling, processing, marketing, and storage.

Consider the following factors in deciding what materials to recycle: contribution to waste stream and disposal costs; processing and handling options and costs; staff and equipment requirements; availability of markets; desires expressed by residents; and avoided cost impact on solid waste budget.

Preliminary identification and selection of markets for recyclables.

Contact recycling markets directly; or

Consider marketing some or all commodities through a recycled materials broker

If markets not available for one or more materials, reconsider whether or not to recycle.

Consider other materials you may collect and how you plan to collect them (scrap metal, brush, used oil, etc.). (See **Worksheet 1**).

Get preliminary estimates of cost of hauling and disposing trash and other nonrecyclable waste (e.g., construction and demolition).

Determine equipment needs -- dependent upon the amounts of material you collect and the market requirements (baler, glass crusher, skid-steer loader, compactor, rollofs, etc.).  
Determine whether purchase or rental option makes most sense, based on cost and operating plans.

Inform public and get public input on materials, processing, and equipment decisions.  
Revise plans as necessary to gain public approval.

## **SITE SELECTION AND DESIGN**

Evaluate possibility of using existing site and/or structures.

Determine necessity of hiring engineering firm to prepare detailed site and building plans.  
If engineering firm to be hired, complete contracting process.

Prepare and distribute Request For Proposals (RFP). (Review RFPs and Requests for Qualifications, or RFQs, prepared by other communities for guidance on what to include and what to avoid. Consider including such items as bid insurance and performance guarantees; work with your municipal counsel to assure that your and the community's interests are protected in the bid documents.)

Obtain references from other communities for whom firms have designed transfer stations and/or recycling facilities.

Evaluate responses to RFP -- Contact other communities used as references by bidding companies; visit other facilities designed by firms; ask operators and local administrators about their experiences with firms. The lowest bid is not necessarily the best for the municipality. Bids should respond to the community's needs for materials handling and processing capabilities, long-term ease of use, possibilities for future expansion, as well as short-term cost. In addition, the successful bidder should be backed up by excellent references from other communities

Finalize contract with selected firm.

Use **Worksheet 1 & 2** and engineer's input to make detailed site and building decisions.

Make sure site and building is accessible by handicapped persons.

Use **Worksheet 3** and engineer's input to estimate costs.

Review engineer's progress at all steps to assure town requirements are met.

Determine construction timetable.

Get public feedback and revise site and building plans as necessary to address public comments.

## **BUILDING DESIGN**

Confirm building design using Worksheet 2, engineer's input, and citizen input. If using existing buildings, confirm necessary modifications.

Use **Worksheet 3** and engineer's input to estimate costs.

Determine construction timetable.

Get public feedback and revise the building design to address comments and concerns.

## **PREPARATION OF CAPITAL AND OPERATING BUDGET**

Involve and inform public and budget committee as you prepare budgets. Get their feedback.

If you will implement *unit-based pricing* (pay-per-bag) as part of your solid waste program, work through additional budget process to implement this program.

(See Coalition of Northeastern Governors document, "*Variable Rate Pricing: A Practical Guide for Local Decisionmakers*," available from DES.).

Determine whether you will establish solid waste management as an independent *special revenue fund*

Get select board's or city council's approval to explore special revenue funding.

Involve municipal legal counsel and administration in preparing special revenue funding accounts using RSA 31:95-c and d.

From engineering plans, estimate capital cost of site work and building construction and/or modification of existing structures.

Plan how to finance capital costs -- through bonding, capital reserve fund, or one-time charge through tax rate.

Get cost estimates for required processing and handling equipment.

Use **Worksheet 1** to help determine equipment needs for materials to be handled by the facility.

Consider rental/lease vs purchase options and their impacts on your budget.

Use materials handling and facility design plans to estimate number of operators required.  
Estimate labor costs.

Use estimates of materials volumes and handling/processing plans to estimate cost of materials management. (*DO NOT* include recyclable revenues in your budget; price fluctuations are too large and too unpredictable.)

Estimate cost of hauling and disposing of nonrecyclable trash and construction and demolition debris.

Finalize timetable for construction.

Prepare detailed *capital* and *operating* budgets for submission to voters. (**Worksheet 3**)

## **MARKETING PLAN TO RESIDENTS/OBTAINING VOTER APPROVAL**

Involve local budget committee in planning process from an early stage. Keep them informed.

Convene hearings and other public meetings to inform public about your decisions and solicit their input.

Conduct public education to inform residents of plans and budget impacts (Mailings, bill stuffers in utility bills, posters, articles in local newspapers, meetings, etc.).

Involve/inform citizen organizations (Rotary, Kiwanis, Women's Club, etc.) and obtain their endorsement of plans.

Consider revisions to materials plans, site and building plans, and budget in response to citizen input.

Prepare planning and budget package for presentation to voters (Warrant article in town meeting communities or ordinance for cities with city council government). See appendix for sample warrant article.

Prepare any materials needed for public presentation at town meeting or city council meeting (Site plans, budget information, supporting witnesses, etc.).

Town meeting or city council vote.

Prepare and publish public notices as required by law.

If vote succeeds, proceed to transfer station construction and implementation of new solid waste management program.

If vote fails, work back through planning process with additional citizen and administration input to address concerns and reasons for failure, and bring revised plan back at subsequent meeting.

**FACILITY CONSTRUCTION**

If site and facility work to be financed by bond, complete all necessary legal and administrative work for bond sale.

Determine permit requirements and obtain all necessary permits

DES solid waste permit.

May also include: wetlands permit; burn permit; local planning and/or zoning approvals (including possible variances); septic system permit. *DES Public Information and Permitting (PIP) Office* can help determine what state permits are necessary, and help work through state permitting process.

Select contractor

Consider possibilities to reduce costs by using local resources, including: donated materials and/or labor; high school or technical school students; town staff; materials salvaged from construction and demolition debris; moving existing town buildings to new site

Prepare Request For Proposals (RFP). Again, consult other towns for guidance, and work with your municipal counsel to assure that your interests are protected in contract documents.

Evaluate responses to RFP -- Contact other clients used as references by bidding companies. The lowest bid is not necessarily the best for the municipality. Company reputation and responsiveness to client needs can be equally important.

Site and building construction

Be prepared to follow construction process closely. Many problems can spring up during construction, which can be eliminated by working closely with contractor, letting the contractor know that his work is being monitored carefully, and obtaining a performance bond from the contractor.

Order equipment

Baler	Glass Crusher	Skid-steer loader
Plastic densifier and/or granulator		Compactor
Rolloffs	Trailers	

**PREPARATION FOR OPERATIONS**

Continue public education to assure residents are prepared to use new facility.  
Examples: What materials will be recycled; mandatory recycling (if any); requirements

for sorting recyclables; fees (if any) for disposal of construction wastes, tires, appliances, etc. Conduct facility tours, meetings with civic groups, etc.  
Develop necessary record keeping forms (Look for good examples from other communities.)

Prepare Safety and Operations Manual. Contact the NH Department of Labor for a copy of the document titled *A Guide For Developing A Written Safety Program*. The NH Solid Waste Rules, Env-Wm 2805.11 provides information on the format and organizational content for a solid waste facility operating plan.

#### Hire staff

- If volunteers or other nonprofessional staff will be utilized, make necessary arrangements

- If operators do not have necessary DES certification, contact DES operator training program to find out dates of next training session

- Assure that staff are trained in use of all equipment (compactor, baler, skid-steer loader, glass crusher, furnace, etc.). Training is generally available from equipment manufacturers.

- If workers will handle money (e.g., collection of disposal fees), they should be bonded (contact municipal counsel for guidance and assistance).

- Assure that staff have good safety training

#### Confirm marketing arrangements for recyclables

- Confirm quality specifications and processing requirements with each market.

- Make/confirm plans for hauling to markets.

#### Contract with hauler and disposal facility

- Prepare Requests for Proposals

- Evaluation of proposals should include checking references from other communities

- Research trends in disposal prices before finalizing contract. If prices are rising, it may be best to negotiate a long-term (e.g., 5 year) contract with a disposal facility.

- If prices are unpredictable or falling, a short-term (1-3 year) contract may be best.

#### Install equipment

- Verify operation

- Get training in operation and maintenance from manufacturers

- Consider service contract options from manufacturers or distributors

## **BEGIN OPERATIONS -- MAKE ADJUSTMENTS**

#### Continue public education

- Ask citizens their opinion of operations

Operators should interact with residents to explain operations, show off facility, answer questions

- ☐ Post instructional signs at facility

Confirm that schedule meets residents' needs

Look for days of high and low usage; if necessary, adjust open hours, or adjust operators' schedules to provide good coverage at all times

Review efficiency of materials handling and processing

Be prepared to make changes to improve operations

## MATERIALS

**Cost Avoidance.** Removing recyclables from the waste stream reduces the amount of solid waste that needs to be hauled and disposed, typically reducing total waste management costs. This impact of collecting and marketing recyclable commodities is called *cost avoidance*.

For example, assume that it costs a town \$65 per ton to haul and dispose of its trash at a landfill. If the town can collect and process recyclable materials for a cost of \$45 per ton, it will save \$20 for every ton of material taken out of the waste stream and into its recycling program. (If the town realizes \$10 per ton in revenue from selling its recyclables, savings will be even greater -- \$30 per ton. However, because there is considerable fluctuation in market prices for recyclables, it is best not to include these revenues when you budget your solid waste and recycling program.)

**What Materials Will You Collect?** The types and quantities of materials accepted at your facility will influence your options for collecting, handling, processing, and storage. They also have a large impact on your costs. As the number and quantity of materials increase, so does the cost to handle, process, and store them. On the other hand, the more you can divert from disposal, the greater your savings in avoided trash hauling and tipping fees.

When you plan what materials to recycle, you should *concentrate first on the materials that have the greatest cost avoidance impact* on your budget. In general, these are the materials that have some combination of heavy weight (that is, the materials that cost most to dispose of) and relatively small processing requirements when they're recycled -- for example, scrap metal, glass, tin cans, and paper (aluminum cans can be added to this list because of their predictably high value in recycling markets). You also have to consider residents' wishes. For example, residents may *insist* that you recycle plastics, even though they are a small percentage of your waste stream, and have relatively intensive processing requirements.

Table 1 summarizes marketing, sorting, processing, and storage options for commonly collected recyclables and other materials.

**Nonrecyclables.** The material left over after recyclables have been removed is the nonrecyclable waste or trash that must be collected and removed from the site for disposal. Several options are available to collect this trash, including portable compactors, built in-place compactors, open rolloff containers, and open topped trailers.

- Compactors are more cost efficient to use than open rolloffs or open-topped trailers because they compact waste into a closed rolloff box. The size of your compactor and loading chute will depend upon the number of users and whether commercial haulers will use your facility. Some small communities use portable compactors that are placed directly on the ground. The disadvantage is that residents must lift their trash to deposit it into the chute of the compactor. Built-in compactors are typically installed below grade so that residents can drop trash down into the compactor. In either case, the loading chute and hopper should be covered so that you don't pay to dispose of rain, ice, and snow. Larger rolloffs used with the compactor are more cost efficient because they need to be hauled less frequently to a disposal facility. However, for small communities there can be disadvantages to using a large rolloff with a compactor. For example, if the rolloff is not hauled frequently during the summer, odors can be a real problem while during the winter trash can freeze so that it can't be removed from the rolloff. In addition, compactors generally require three-phase electric power, which may not be available in rural locations and is very expensive to bring on site. The best advice to properly size the compactor and enclosed rolloff for your community is to talk to other towns that use compactors and to sales representatives from equipment vendors.
- Open-topped trailers and rolloffs should be located below grade so that residents can drop their trash down into the trailer/rolloff. As in the case of the compactor, the trailer/rolloff should be kept under cover to prevent the accumulation of rainwater, snow, and ice. If a roof is used for a cover, it must be high enough for larger vehicles to dump their trash. One disadvantage of using a trailer/rolloff is that the trash is not thoroughly compacted. A

backhoe or loader can be used to compact the trash as much as possible.

**Materials and Markets.** Market considerations should be central to your planning, because which materials you recycle, and where and how you market them, have a large impact on facility design and operation, and on your budget. You must be careful to plan your recycling operations around your markets: identify potential markets early in your planning; know their processing and quality specifications; and handle and process the materials so that they are easy to market. Table 1 summarizes marketing considerations for commonly collected recyclables. A list of brokers of recyclables can be obtained from DES at (603) 271-1749 or at our website address: [www.des.state.nh.us/pcas](http://www.des.state.nh.us/pcas)

**Processing Options.** Processing options include baling, compacting, granulating, crushing, and various forms of loose storage. The option(s) you choose will depend on the materials you collect, the space you have available for handling and storage, your budget, and -- *most importantly* -- what markets will accept. In addition, you should be aware how changeable markets for recyclables can be -- one year accepting a material shipped loose in gaylords (large cardboard boxes), the next year insisting that the same material must be baled.

**Secondary Sort.** Unless you collect commingled recyclables, your residents will be required to sort their recycled materials before they drop them off at your facility. A "secondary sort" is a second sorting of these materials, carried out by recycling center staff, before the recyclables are further processed and marketed. A secondary sort is necessary for *almost all recyclables* to prepare them for market. Nearly all markets have tight quality guidelines specifying the maximum levels of contaminants they'll accept. It doesn't take more than one or two contaminated loads before your markets will start to turn you away. Some materials, like glass, will be rejected with only a tiny percentage of contaminants, and returned to you *at your expense*. For this reason, most facility operators consider a secondary sort of almost all materials to be an essential part of their operations.

**Equipment Needs.** Your equipment needs depend on the materials you collect and your choice of marketing, processing, and storage options. Investment in equipment can increase

working efficiencies, increase the revenues you receive for recyclables, and reduce your need for storage space. Balanced against these advantages are added materials handling requirements, capital costs, and insurance costs. Depending on materials, marketing, and processing plans, equipment purchases may include a baler, a glass crusher, and a plastic densifier and/or granulator. In addition, a skid-steer loader or other small forklift/loader is essential to efficiently move and stack baled material. These equipment choices are reflected in the material processing options described in Tables 1 and 2. Again, it cannot be overemphasized how helpful it can be to visit other facilities to see what equipment is being used, how equipment choices have affected processing and other operations, and help plan your own facility to operate most efficiently.

**Is a Baler Needed?** A baler may be a good investment, *if* you plan to collect materials that command higher market prices when they are baled (for example, newspaper and cardboard), *if* you will process sufficient volumes of baled materials to justify the cost, *if* you have sufficient space to store and handle materials efficiently before and after you bale them, *if* your budget will support the cost, and *if* you have the work force needed to do the extra handling. Once more, visits and discussions with other facility operators may be your best tool to decide whether purchasing a baler makes sense for your community.

**Handling, Processing, and Storage Costs.** When you prepare your facility budget, the costs associated with recycling can be broken out as follows: *handling costs*, including sorting, moving materials to and from processing and storage, and loading them for transport; *processing costs*, including both the time required for processing, and the capital cost of processing equipment; and *storage costs*, mostly the capital cost of storage space before and after materials are processed.

**Revenues and Avoided Costs.** Balanced against the costs of handling and marketing recyclables are (1) any *revenues* received from their sale, and (2) *avoided disposal costs* -- money that does not have to be spent on disposal because materials are recycled. Because of the large and frequent fluctuations in recycling markets, you should not count on

recycling revenues to have a large impact on your solid waste budget. Instead of attempting to maximize revenues, your recycling strategy should focus on assuring that you will always have markets for your recyclables, (and, if possible negotiating a "floor" price for each commodity, that is, a minimum per ton price guaranteed by your market). **Moving materials consistently and maximizing avoided costs is much more important than getting the best possible price for every load you recycle.**

**"Select" Wastes.** These are materials that are handled separately from common recyclables and the wastes that go into a compactor. Examples include brush, leaf and yard waste, scrap metal, tires, construction and demolition debris, and bulky items (furniture, etc.). Space must be set-aside in your site layout to collect, process, and store these materials. Table 2 and fact sheets found at DES's website ([www.des.state.nh.us](http://www.des.state.nh.us)) describe processing, storage, and marketing options for these materials.

**"Universal Wastes".** Universal wastes (antifreeze, rechargeable batteries, mercury-containing devices and fluorescent light tubes) have historically contributed the majority of hazardous constituents disposed of as part of the household and commercial solid waste stream. New Hampshire has adopted policies that provide cost effective alternatives to divert these toxic materials from landfills and incinerators. Also, additional information on universal waste is found in the document, *Best Management Practices for Transfer Stations/ Recycling Centers* available from DES at (603) 271-1749 or at the website: [www.des.state.nh.us/pcas](http://www.des.state.nh.us/pcas).

**TABLE 1**  
**PROCESSING, STORAGE, AND MARKETING OPTIONS FOR RECYCLABLE COMMODITIES**

<b>MATERIAL</b>	<b>MARKETS</b>	<b>SORTING</b>	<b>PROCESSING</b>	<b>STORAGE</b>
Newspaper (ONP)	<ul style="list-style-type: none"> <li>• Can be marketed to paper processor, broker, end user, or material recovery facility in one of several grades, depending on how collected and sorted.</li> <li>• More highly sorted, contaminant-free newspaper receives best price.</li> <li>• Can be marketed as part of mixed paper.</li> <li>• Can be used for animal bedding.</li> </ul>	<ul style="list-style-type: none"> <li>• Secondary sort necessary for some markets.</li> <li>• Tradeoff between sorting and revenues received; more highly sorted newspaper can receive higher revenue.</li> </ul>	<ul style="list-style-type: none"> <li>• Depends on market. Can be shipped loose (in trailers or covered rollofs), in gaylords, or baled.</li> <li>• Baling reduces space required for storage.</li> </ul>	<ul style="list-style-type: none"> <li>• Indoors - building, trailer, or weatherproof rolloff. Keep from getting wet.</li> <li>• Storage area should be large enough to hold trailer load (for some markets, load can be mixed with other paper types).</li> </ul>
Corrugated Cardboard (OCC)	<ul style="list-style-type: none"> <li>• Paper processor, broker, end user, or material recovery facility.</li> </ul>	<ul style="list-style-type: none"> <li>• Secondary sort typically necessary.</li> <li>• Asian cardboard and chipboard may be problem contaminants.</li> </ul>	<ul style="list-style-type: none"> <li>• Depends on market. Can be shipped loose (trailer or covered rolloff), in gaylords, or baled.</li> <li>• Baling greatly reduces space required for storage.</li> </ul>	<ul style="list-style-type: none"> <li>• Indoors - building, trailer, or covered rolloff. Keep from getting wet.</li> <li>• Storage area should be large enough to hold trailer load (for some markets, cardboard can be mixed with other paper types).</li> </ul>

**TABLE 1**  
**PROCESSING, STORAGE, AND MARKETING OPTIONS FOR RECYCLABLE COMMODITIES**

<b>MATERIAL</b>	<b>MARKETS</b>	<b>SORTING</b>	<b>PROCESSING</b>	<b>STORAGE</b>
Mixed Paper	<ul style="list-style-type: none"> <li>• Paper processor, broker, or end user, or material recovery facility.</li> </ul>	<ul style="list-style-type: none"> <li>• Secondary sort necessary for many but not all markets</li> </ul>	<ul style="list-style-type: none"> <li>• Typically shipped loose or in gaylords. Infrequently baled.</li> </ul>	<ul style="list-style-type: none"> <li>• Indoors - building, trailer, or weatherproof rolloff. Keep from getting wet or sun damaged.</li> <li>• Storage area should be large enough to hold trailer load (for some markets, load can be mixed with other paper types).</li> </ul>
Magazines (OMG)	<ul style="list-style-type: none"> <li>• Paper processor, broker, end user, or material recovery facility.</li> <li>• Can be marketed as component of mixed paper.</li> </ul>	<ul style="list-style-type: none"> <li>• Secondary sort usually necessary. Confirm with market.</li> </ul>	<ul style="list-style-type: none"> <li>• Typically shipped loose or in gaylords. May be baled in horizontal baler with newspaper for some markets.</li> </ul>	<ul style="list-style-type: none"> <li>• Indoors - building, trailer, or weatherproof rolloff. Keep from getting wet.</li> <li>• Storage area should be large enough to hold trailer load (for some markets, load can be mixed with other paper types).</li> </ul>

**TABLE 1**  
**PROCESSING, STORAGE, AND MARKETING OPTIONS FOR RECYCLABLE COMMODITIES**

MATERIAL	MARKETS	SORTING	PROCESSING	STORAGE
Office Paper	<ul style="list-style-type: none"> <li>• Paper processor, broker, end user, or material recovery facility.</li> </ul>	<ul style="list-style-type: none"> <li>• Depends on market. Numerous specifications defined by different markets.</li> </ul>	<ul style="list-style-type: none"> <li>• Typically shipped loose or in gaylords. Rarely baled.</li> </ul>	<ul style="list-style-type: none"> <li>• Indoors - building, trailer, or weatherproof rolloff. Keep from getting wet.</li> <li>• Storage area should be large enough to hold trailer load (for some markets, load can be mixed with other paper types).</li> </ul>
Glass	<ul style="list-style-type: none"> <li>• <b>Cullet*</b>: Remanufacture into new containers.</li> <li>• <b>Aggregate</b>: Mixed with gravel or used alone as construction aggregate, e.g., road sub-base, base for parking lots and walk ways, backfill, etc.</li> </ul> <p>*Cullet is glass collected to be melted into new products.</p>	<ul style="list-style-type: none"> <li>• <b>Cullet</b>: Only food &amp; beverage container glass acceptable. Secondary sort necessary to eliminate contamination. Very small proportion of contaminants can result in load rejection. Clear, Brown, and green collected separately.</li> <li>• <b>Aggregate</b>: No secondary sort needed. Window glass, mirrors, ceramics all acceptable.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Cullet</b>: Typically shipped partially crushed or whole. Cullet markets typically do not want glass finely crushed. Contact specific market(s) for specifications.</li> <li>• <b>Aggregate</b>: Processing for Processed Glass Aggregate (PGA) at local discretion, using on-site equipment. Typically crushed to 1" or less.</li> </ul>	<ul style="list-style-type: none"> <li>• Indoors or out. For <b>cullet</b> market, must store in rolloff or in concrete bunker to prevent contamination with gravel, etc.</li> <li>• Storage bins must be large enough (width and height) to accommodate loader or other loading equipment.</li> <li>• To estimate required bunker size, 1yd<sup>3</sup> equals one ton of partially crushed glass.</li> </ul>

**TABLE 1**  
**PROCESSING, STORAGE, AND MARKETING OPTIONS FOR RECYCLABLE COMMODITIES**

<b>MATERIAL</b>	<b>MARKETS</b>	<b>SORTING</b>	<b>PROCESSING</b>	<b>STORAGE</b>
Aluminum Cans	<ul style="list-style-type: none"> <li>• Metal brokers or dealers, or material recovery facilities. Recycled back into new containers.</li> </ul>	<ul style="list-style-type: none"> <li>• Some secondary sort necessary.</li> <li>• Some markets accept commingled with tin cans.</li> <li>• Simple magnetic head conveyor can be used to separate steel from aluminum containers.</li> </ul>	<ul style="list-style-type: none"> <li>• Can be shipped loose (dumpsters, gaylords, rolloffs) or baled.</li> </ul>	<ul style="list-style-type: none"> <li>• Indoors or outdoors under cover (to prevent accumulation of rain water).</li> </ul>
Tin (steel) Cans	<ul style="list-style-type: none"> <li>• Scrap metal brokers or dealers, or material recovery facilities. Recycled back into new containers or other steel products.</li> </ul>	<ul style="list-style-type: none"> <li>• Some secondary sort necessary</li> <li>• Some markets accept commingled with aluminum cans.</li> <li>• Simple magnetic head conveyor can be used to separate steel from aluminum containers.</li> <li>• Some markets accept aerosol cans with other steel cans.</li> </ul>	<ul style="list-style-type: none"> <li>• Can be shipped loose (dumpsters, gaylords, rolloffs) or baled (infrequently).</li> </ul>	<ul style="list-style-type: none"> <li>• Indoors or outdoors under cover (to prevent rust).</li> </ul>

**TABLE 1**  
**PROCESSING, STORAGE, AND MARKETING OPTIONS FOR RECYCLABLE COMMODITIES**

MATERIAL	MARKETS	SORTING	PROCESSING	STORAGE
PETE (Polyethylene terephthalate)	<ul style="list-style-type: none"> <li>• Brokers, material recovery facilities. End users rarely purchase directly from municipalities.</li> <li>• Very tight quality specifications (no mingling with other plastics).</li> <li>• Material recovery facilities typically accept mingled with other containers.</li> <li>• A few markets continue to pay price premium for color separation or for separation of soda bottles from “custom” PETE. Separation no longer necessary for most markets, however.</li> </ul>	<ul style="list-style-type: none"> <li>• Secondary sort generally necessary to remove unacceptable plastic.</li> </ul>	<ul style="list-style-type: none"> <li>• Typically baled. Contact markets for specifications. Caps need to be removed for baling.</li> <li>• Rarely shipped loose because of very low weight compared to volume.</li> </ul>	<ul style="list-style-type: none"> <li>• Indoors or outdoors under cover. Prevent exposure to sunlight.</li> <li>• Very large storage volume required prior to baling to accumulate sufficient PETE for one bale. (Approximately 30 cubic yards of loose storage required per bale in standard downstroke baler.)</li> </ul>

**TABLE 1**  
**PROCESSING, STORAGE, AND MARKETING OPTIONS FOR RECYCLABLE COMMODITIES**

MATERIAL	MARKETS	SORTING	PROCESSING	STORAGE
<p>Translucent (Clear) HDPE (High-Density Polyethylene) (Milk, water, and some juice jugs)</p>	<ul style="list-style-type: none"> <li>• Brokers, material recovery facilities. End users rarely purchase directly from municipalities.</li> <li>• Typically tight quality specifications (no mingling with other plastics).</li> <li>• Material recovery facilities typically accept mingled with other containers.</li> </ul>	<ul style="list-style-type: none"> <li>• Secondary sort generally necessary to remove unacceptable plastics and other contaminants (e.g., milk jug caps).</li> </ul>	<ul style="list-style-type: none"> <li>• Typically baled. Contact markets for specifications.</li> <li>• Rarely shipped loose because of very low weight compared to volume.</li> <li>• Market may allow granulation.</li> </ul>	<ul style="list-style-type: none"> <li>• Indoors or outdoors under cover. Prevent exposure to sunlight.</li> <li>• Very large storage volume required prior to baling to accumulate sufficient HDPE for one bale. (Approximately 30 cubic yards of loose storage required per bale in standard downstroke baler.)</li> <li>• Perforating or crushing can reduce volume up to 75% prior to baling.</li> </ul>

**TABLE 1**  
**PROCESSING, STORAGE, AND MARKETING OPTIONS FOR RECYCLABLE COMMODITIES**

<b>MATERIAL</b>	<b>MARKETS</b>	<b>SORTING</b>	<b>PROCESSING</b>	<b>STORAGE</b>
Pigmented (colored) HDPE containers	<ul style="list-style-type: none"> <li>• Brokers, material recovery facilities. End users rarely purchase directly from municipalities.</li> <li>• Typically tight quality specifications (no mingling with other plastics). Most markets accept only blow-molded HDPE (narrow-mouth containers), not injection molded (wide mouths, tubs, etc.)</li> <li>• Material recovery facilities typically accept mingled with other containers.</li> </ul>	<ul style="list-style-type: none"> <li>• Secondary sort generally necessary to remove unacceptable plastics and other contaminants.</li> </ul>	<ul style="list-style-type: none"> <li>• Typically baled. Contact markets for specifications.</li> <li>• Can be granulated.</li> <li>• Rarely shipped loose because of very low weight compared to volume.</li> </ul>	<ul style="list-style-type: none"> <li>• Indoors or outdoors under cover. Prevent exposure to sunlight.</li> <li>• Very large storage volume required prior to baling to accumulate sufficient HDPE for one bale.</li> </ul>

**TABLE 1**  
**PROCESSING, STORAGE, AND MARKETING OPTIONS FOR RECYCLABLE COMMODITIES**

MATERIAL	MARKETS	SORTING	PROCESSING	STORAGE
Other Plastics	<ul style="list-style-type: none"> <li>Markets can be hard to locate. Markets typically offer no revenue, and may require buy back of equivalent amount of finished product.</li> <li>#3 (polyvinyl chloride) and #5 (polypropylene) plastics have established markets but are such a small percentage of municipal plastic stream that they are not economical to collect.</li> </ul>	<ul style="list-style-type: none"> <li>Very dependent on market.</li> <li>Secondary sort unnecessary for plastics going to “plastic lumber” or other mixed plastic products.</li> <li>Secondary sort can be necessary if resins marketed to single resin end uses.</li> </ul>	<ul style="list-style-type: none"> <li>Typically baled. Contact markets for specifications.</li> <li>Rarely shipped loose because of very low weight compared to volume.</li> </ul>	<ul style="list-style-type: none"> <li>Indoors or outdoors under cover. Prevent exposure to sunlight. Very large storage volume required prior to baling to accumulate sufficient plastic for one bale.</li> <li>Problem of sufficient storage space particularly acute if single resins are collected. May take months or years to collect sufficient plastic for single bale.</li> </ul>
Textiles	<ul style="list-style-type: none"> <li>Brokers.</li> <li>Goodwill, Salvation Army, or other charitable organization.</li> <li>Swap shop.</li> </ul>	<ul style="list-style-type: none"> <li>Sort typically unnecessary, but contact markets for specifications.</li> <li>Brokers typically do not want textiles that have been previously sorted to remove high quality items (e.g., for Goodwill or swap shop).</li> <li>Charitable organization may install collection box(es) and periodically remove textiles.</li> </ul>	<ul style="list-style-type: none"> <li>Depends on market. Contact market for instructions.</li> <li>Baled or shipped loose in bags.</li> <li>Processing unnecessary if marketed to Goodwill, Salvation Army, or other organizations that installs collection boxes.</li> </ul>	<ul style="list-style-type: none"> <li>Indoors or in weatherproof container (e.g., trailer).</li> <li><b><i>Imperative</i></b> to keep dry. Mildew in one or a few items can contaminate whole bale or bag.</li> <li>Must ship within 6 months to prevent creasing.</li> </ul>

**TABLE 2**  
**PROCESSING, STORAGE, AND MARKETING OPTIONS FOR “SELECT” WASTES**

MATERIAL	MARKETS	PROCESSING	STORAGE
Brush	<ul style="list-style-type: none"> <li>• Banned from landfill/incineration</li> <li>• Few or no commercial markets</li> <li>• Typically burned or chipped on-site for mulch or compost bulking agent</li> </ul>	<ul style="list-style-type: none"> <li>• Burning</li> <li>• Chipping for mulch or compost bulking agent</li> </ul>	<ul style="list-style-type: none"> <li>• Typically piled until burn day or opportunity for chipping</li> <li>• After chipping, piled for use by residents or incorporation into compost</li> </ul>
Leaf and Yard Waste	<ul style="list-style-type: none"> <li>• Banned from landfill/incineration</li> <li>• Few or no commercial markets</li> <li>• Many rural communities do not accept at TS/RC; residents manage at home</li> <li>• Many communities compost</li> </ul>	<ul style="list-style-type: none"> <li>• Compost</li> <li>• Some municipalities simply allow residents to remove as compost or mulch for home use</li> </ul>	<ul style="list-style-type: none"> <li>• Compost piles</li> </ul>
Scrap Metal	<ul style="list-style-type: none"> <li>• Virtually all scrap metal dealers</li> </ul>	<ul style="list-style-type: none"> <li>• Rarely processed by transfer station operator. Some markets will bale on site before transportation.</li> <li>• Many municipalities sort to remove nonferrous metals (aluminum, copper, etc.), which receive much higher prices than mixed scrap.</li> <li>• Must remove CFCs from appliances (refrigerators, air conditioners, dehumidifiers) before marketing as scrap. See next page.</li> </ul>	<ul style="list-style-type: none"> <li>• Depends on market and site design constraints. Typically stored loose in piles or in open rollofs.</li> </ul>

**TABLE 2**  
**PROCESSING, STORAGE, AND MARKETING OPTIONS FOR “SELECT” WASTES**

MATERIAL	MARKETS	PROCESSING	STORAGE
Appliances (Frequent fee item <sup>1</sup> )	<ul style="list-style-type: none"> <li>• Virtually all scrap metal dealers</li> <li>• Important to assure that market will responsibly remove chlorofluorocarbons (CFCs) from refrigerators and air conditioners</li> </ul>	<ul style="list-style-type: none"> <li>• Rarely processed by transfer station operator. Some markets will bale on site before transportation</li> <li>• Facility operator responsible for assuring that CFCs are removed before appliances are removed from site</li> </ul>	<ul style="list-style-type: none"> <li>• Typically stored outdoors on ground. Must provide access to refrigerators, air conditioners for removal of CFCs.</li> <li>• After CFC removal, can be stored mixed with other scrap metal.</li> </ul>
Used Motor Oil	<ul style="list-style-type: none"> <li>• Frequently used on site or in other municipal facility to provide space heat (used oil furnace)</li> <li>• Fuel blender (blends with virgin oil for sale as heating fuel)</li> <li>• Re-refiner (removes contaminants, blends to specifications, markets as motor oil)</li> </ul>	<ul style="list-style-type: none"> <li>• No processing required</li> <li>• Take steps to assure that oil is not blended with other fluids (e.g., antifreeze). If blending occurs, oil may have to be handled as hazardous waste.</li> </ul>	<ul style="list-style-type: none"> <li>• Typically stored on site in barrels or drums</li> <li>• Specific storage and labeling requirements apply</li> </ul>
Tires (Frequent fee item)	<ul style="list-style-type: none"> <li>• Several markets available</li> </ul>	<ul style="list-style-type: none"> <li>• Rarely, if ever, processed on site</li> </ul>	<ul style="list-style-type: none"> <li>• Outdoors in piles</li> <li>• In roadworthy or dead trailers.</li> <li>• Specific regulatory requirements and limits on number stored apply</li> </ul>

**TABLE 2**  
**PROCESSING, STORAGE, AND MARKETING OPTIONS FOR “SELECT” WASTES**

<b>MATERIAL</b>	<b>MARKETS</b>	<b>PROCESSING</b>	<b>STORAGE</b>
Automotive Batteries	<ul style="list-style-type: none"> <li>• Almost all N.H. scrap metal dealers.</li> <li>• Many automotive retailers and service providers (Sears, K Mart, etc.).</li> </ul>	<ul style="list-style-type: none"> <li>• None required</li> </ul>	<ul style="list-style-type: none"> <li>• Must be stored indoors, off the ground, in a manner to prevent breakage of casings and capture any acid leaks.</li> <li>• Specific regulatory requirements apply (see Appendix B fact sheet)</li> </ul>
Construction/Demolition (Frequent fee item)	<ul style="list-style-type: none"> <li>• Dedicated C&amp;D landfills or mixed waste landfills</li> <li>• Several recycling and processing markets available for mixed or source separated materials</li> </ul>	<ul style="list-style-type: none"> <li>• Rarely processed on site</li> </ul>	<ul style="list-style-type: none"> <li>• Typically stored in open rolloff. Preferable for rolloff to be under cover to keep water out</li> <li>• Specific materials (e.g., shingles, clean wood waste) can be stored separately for specific markets</li> </ul>
Bulky Items (Furniture, etc.) (Frequent fee item)	<ul style="list-style-type: none"> <li>• Few or no markets</li> <li>• Items with useful remaining life can be reused through swap shop</li> </ul>	<ul style="list-style-type: none"> <li>• Many facilities dissemble to reduce volume and recover metals</li> <li>• Some facilities require residents to dissemble before items are accepted</li> </ul>	<ul style="list-style-type: none"> <li>• Typically disposed with mixed waste</li> </ul>

Notes: <sup>1</sup>Many facilities charge a fee to residents to cover disposal cost of these items. Fees charged per unit (tires, appliances) or per volume discarded (construction/demolition).

## SITE PLANNING AND LAYOUT

**Permits.** In New Hampshire, most transfer stations and recycling centers (for exceptions see Env-Wm 302.03 and Env-Wm 2108) require a facility permit to construct and to operate issued by the Department's Waste Management Division. In addition, other local and state permits may be required before construction and/or operation of the facility can begin. Local permits typically include planning and/or zoning board approvals and building permits. Potentially applicable state authorizations include a Wetlands Board Permit and a Site Specific Permit for alteration of terrain. The DES Public Information and Permitting (PIP) office can assist in determining what state permits (in addition to a solid waste permit) may be required (contact: 271-2975).

**Site Layout.** It's important to have a well laid out site for a cost efficient and easy to use facility. Development of the site can be phased in over a period of time. Figures 2-8 present some of the features to consider including: flow of traffic and people, materials flow, access for material movement, storage space, room for compost, scrap metal, tire, and burn piles, and good sight lines for facility operators. Another important consideration, especially in populated areas is the use of landscaping to buffer the site from adjacent properties.

**Site Safety.** Good site layout incorporates features that provide for the safety of residents coming to the facility and the operators working there. These features include: good traffic flow (e.g., no crossovers, minimal backing and turning, etc.); handrails and/or fences in appropriate places; clear lines of vision; separation of residents from all power equipment (e.g., operating balers, forklifts, or loaders); planning water runoff to prevent ponding and directing water away from dropoff, processing, and storage areas; planning for efficient snow and ice removal; and clear and abundant signs (stop signs, directions, labels for dropoff windows, etc.).

**One-Way Traffic Flow.** For safety and efficiency, traffic and people should flow in one direction. There should be nowhere that residents need to cross a traffic lane, or that vehicles

need to back up or turn sharply to get from one part of the facility to another. One method to speed up movement through the facility is to have access to the rubbish compactor from two sides. Residents with small amounts of trash can use the ‘express lane’ and the ‘slow lane’ for vehicles with large loads. If your facility allows dump body trucks to use the compactor, these vehicles that have to back up to deposit their loads can also use the ‘slow lane’.

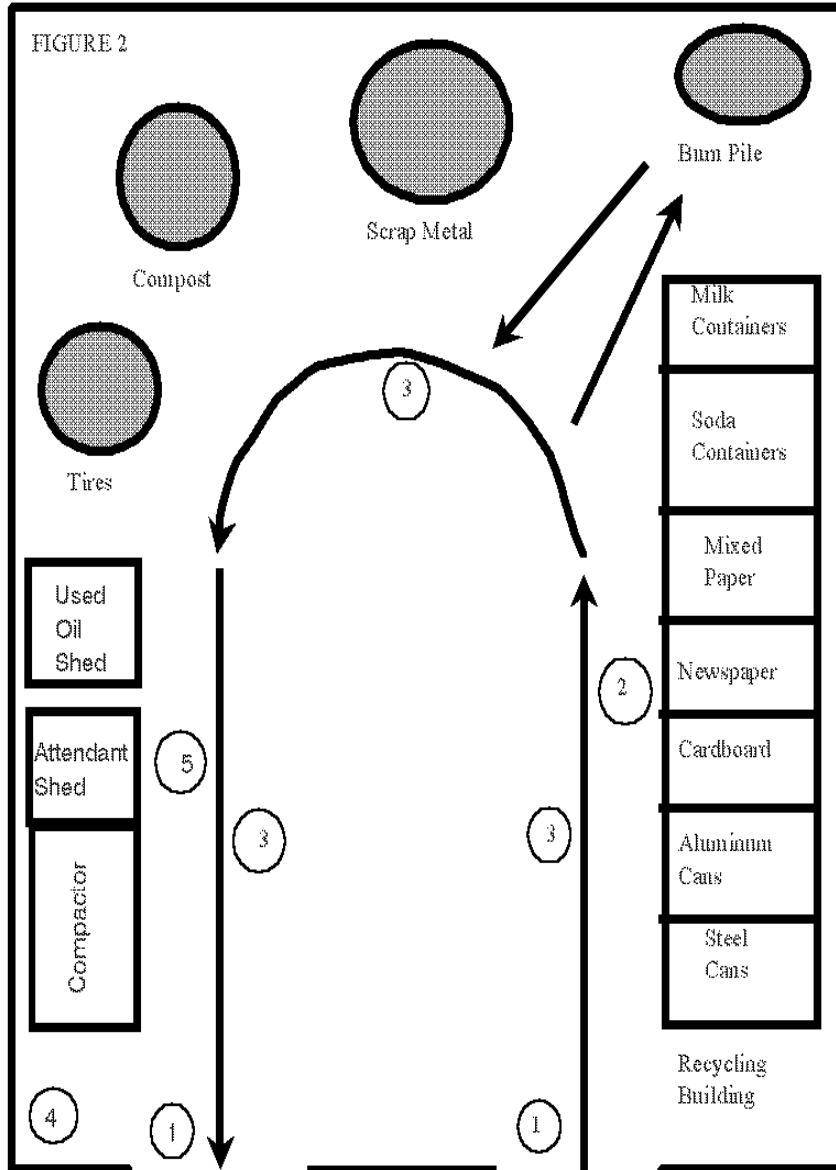
**Plenty of Space for Traffic and People.** Ample space should be available for residents to park their vehicles, unload trash and recyclables, deposit them in designated locations, and exit the facility. Plan for your most crowded day, and consider future needs (population growth, addition of more types of materials to recycle, etc.).

**Recyclables First.** Design the traffic flow so that recyclables are the **first** materials deposited by residents when they enter the facility. The compactor or rolloff for nonrecyclable waste should be placed at the end of the natural traffic flow. This design encourages residents to recycle by emphasizing the importance of recycling and making it difficult for facility users to avoid being observed by facility operators and other residents if they pass by the dropoff locations for recyclables.

**Lines of Sight.** As much as possible, the layout should allow a single operator to view all the areas where residents are depositing waste. This allows the operator to make sure that all materials are deposited in proper locations, that all fees are paid (e.g., for tires, appliances, and construction and demolition waste), and that no improper or illegal disposal takes place (e.g., contaminated wood waste in a burn pile).

**Compost, Scrap Metal, Tires, Brush.** These materials require large outdoor areas for storage, processing (for example, turning compost, removing CFCs from appliances), and loading prior to shipment (for example, access lanes to scrap metal rolloffs). Site design must incorporate ample room and clear access to these materials for residents, operators, and haulers. Guidelines for the space required to store and handle these materials are provided in Table 2.

FIGURE 2



**Pluses:**

1. Separate entrance and exit -- one way traffic flow.
2. Recyclables deposited first, nonrecyclables deposited last in compactor.
3. No cross traffic of vehicles or people.
4. Facility is fenced in to prevent vandalism.
5. The whole facility is within sight of attendant.

**Minuses:**

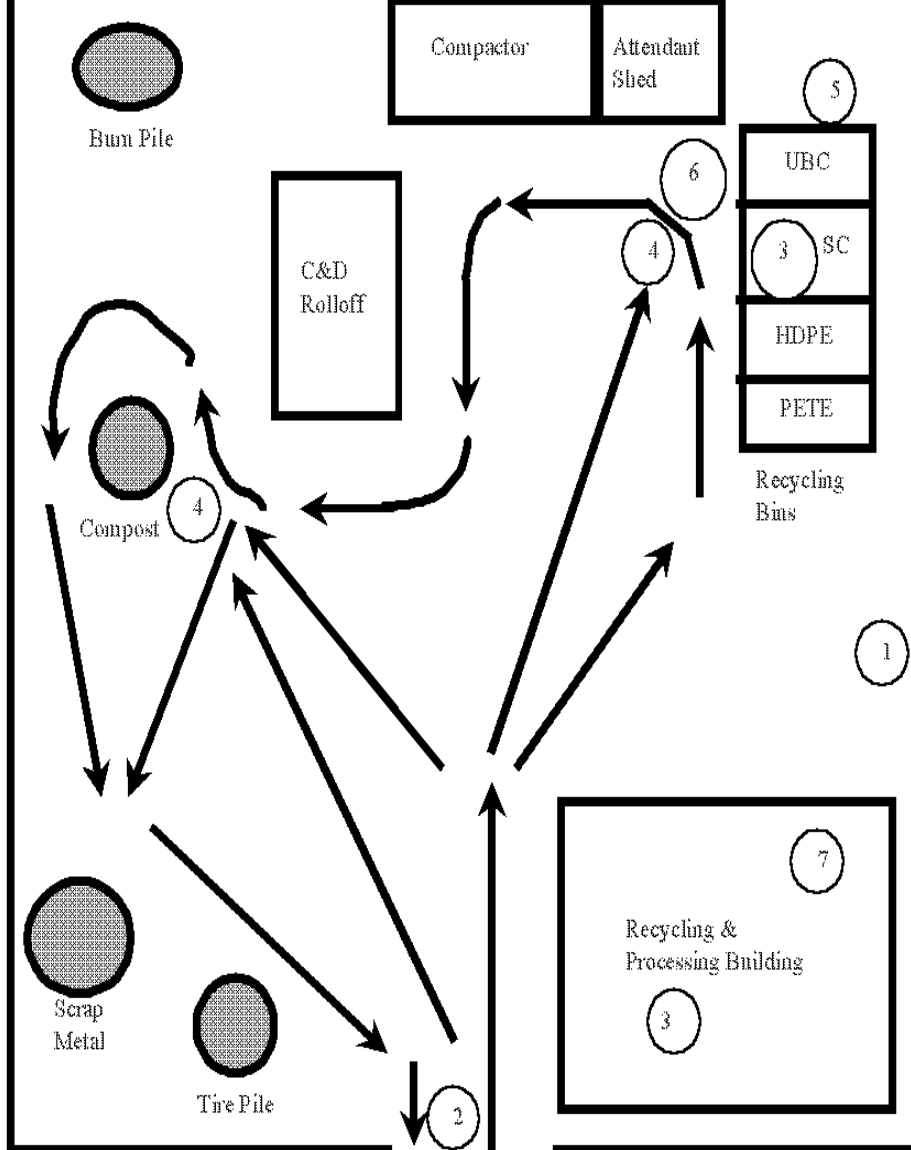
6. No processing done.

**Summary:**

This facility is a good design for a small town that doesn't generate enough recyclables to process. It allows good traffic flow with easy access to deposit recyclables and other materials. There is no processing done; recyclables are marketed loose.

**Notes:** Recycling building is a low cost open faced shed. Residents deposit recyclables into gaylords.

FIGURE 3



**Pluses:**

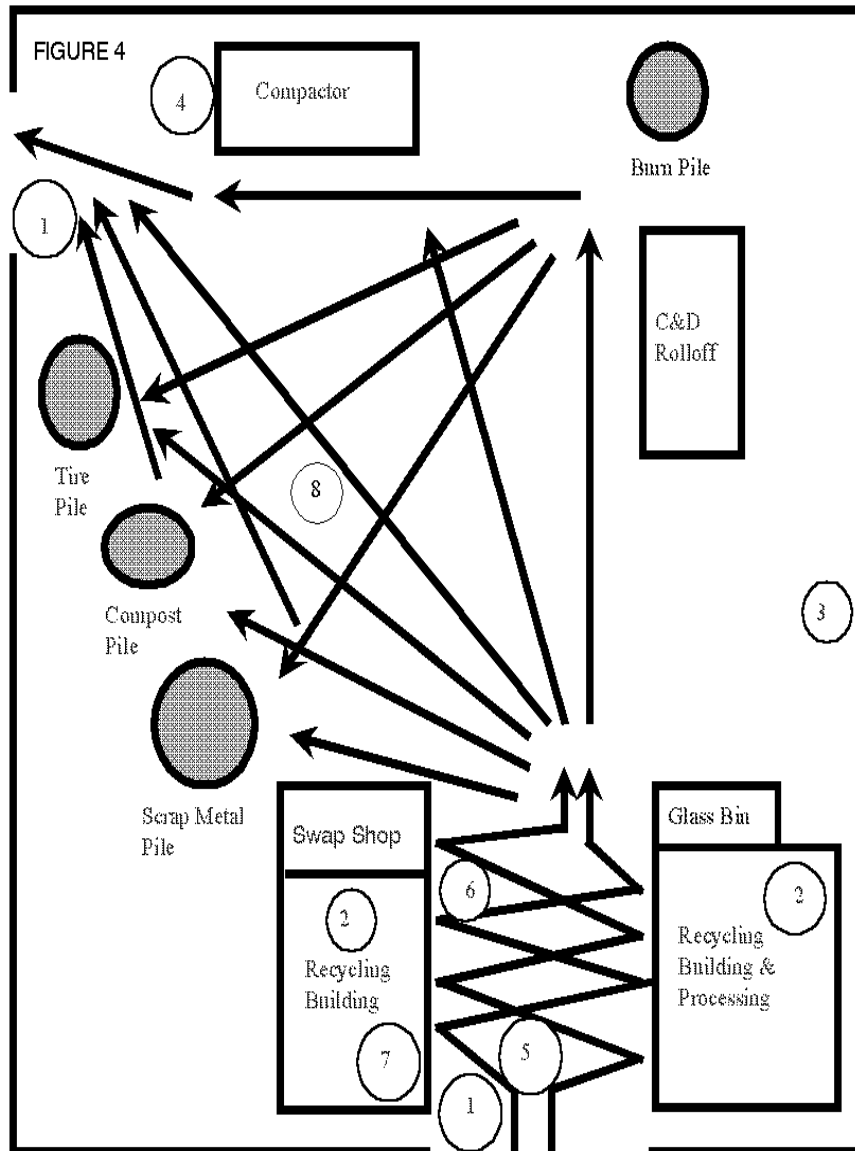
1. Facility is fenced to prevent vandalism.

**Minuses:**

2. Small single entrance and exit.
3. Recyclables have to be deposited at both the recycling & processing building and in the recycling bins.
4. Cross traffic of vehicles.
5. Recyclables collected in recycling bins must be moved to recycling building for processing.
6. Attendant cannot see entire facility from office.
7. Insufficient storage space in recycling & processing building.

**Summary:** Too much cross traffic and too small entrance/exit. Inefficient and unpleasant for people to use. Recyclables in recycling bins require extra handling to move for processing. The recycling building has insufficient space and would benefit from the use of live or dead trailers for storage.

**Notes:** Recycling bins are covered by a roof only. Recyclables such as cardboard, newspaper, etc. are collected in the processing building. UBC=Used Beverage Cans, SC= Steel Cans, HDPE=High Density Polyethylene, PETE=Polyethylene Terephthalate



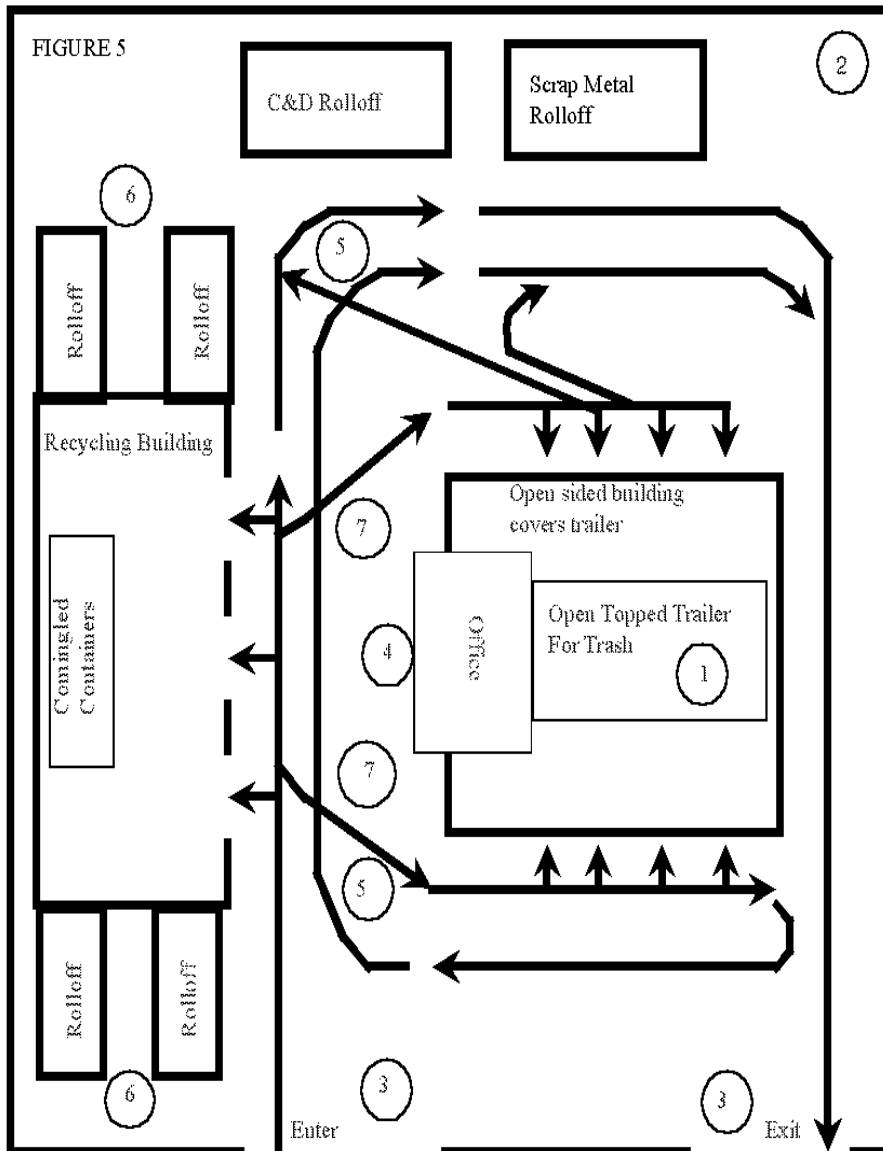
**Pluses:**

1. Separate entrance and exit - one way traffic flow.
2. Recyclables are deposited first.
3. Facility is fenced in to prevent vandalism.
4. Nonrecyclables are deposited last.

**Minuses:**

5. Recyclables are deposited in two separate recycling buildings requiring cross traffic of vehicles and people.
6. Attendant can not see entire facility from recycling building.
7. Some recyclables have to be moved to processing building.
8. Additional cross traffic with backing and turning to reach C&D rolloff, compost pile, compactor, and other parts of facility.

**Summary:** Cross traffic is most serious problem with this facility design. The major cause of this problem is that deposit areas for recyclables are not on the same side of the drive through. This is inefficient and potentially dangerous. In addition, extra handling of recyclables is required to move them to processing building.



#### Pluses:

1. Good use of elevations. Trash goes down into trailer for transport.
2. Facility is fenced to prevent vandalism.
3. Separate entrance and exit.
4. Operator can see entire site from office.

#### Minuses:

5. Infinite possibilities for traffic tie up.
6. No room to expand number of recyclables accepted.
7. From recycling building residents cannot see open bays in building for trash discard.

#### Summary:

The layout makes good use of change in site elevation. However, the layout of the buildings and rolloffs creates a disastrous traffic pattern. There is no room to expand to add more recyclables including compost.

**Notes:** Both recyclables and trash collected in unheated buildings. Recyclables are marketed unprocessed. Residents deposit recyclables directly into covered rolloffs or open rolloff. For comingled containers, lack of processing capabilities minimizes or eliminates potential revenues from sale of recyclables.

FIGURE 6

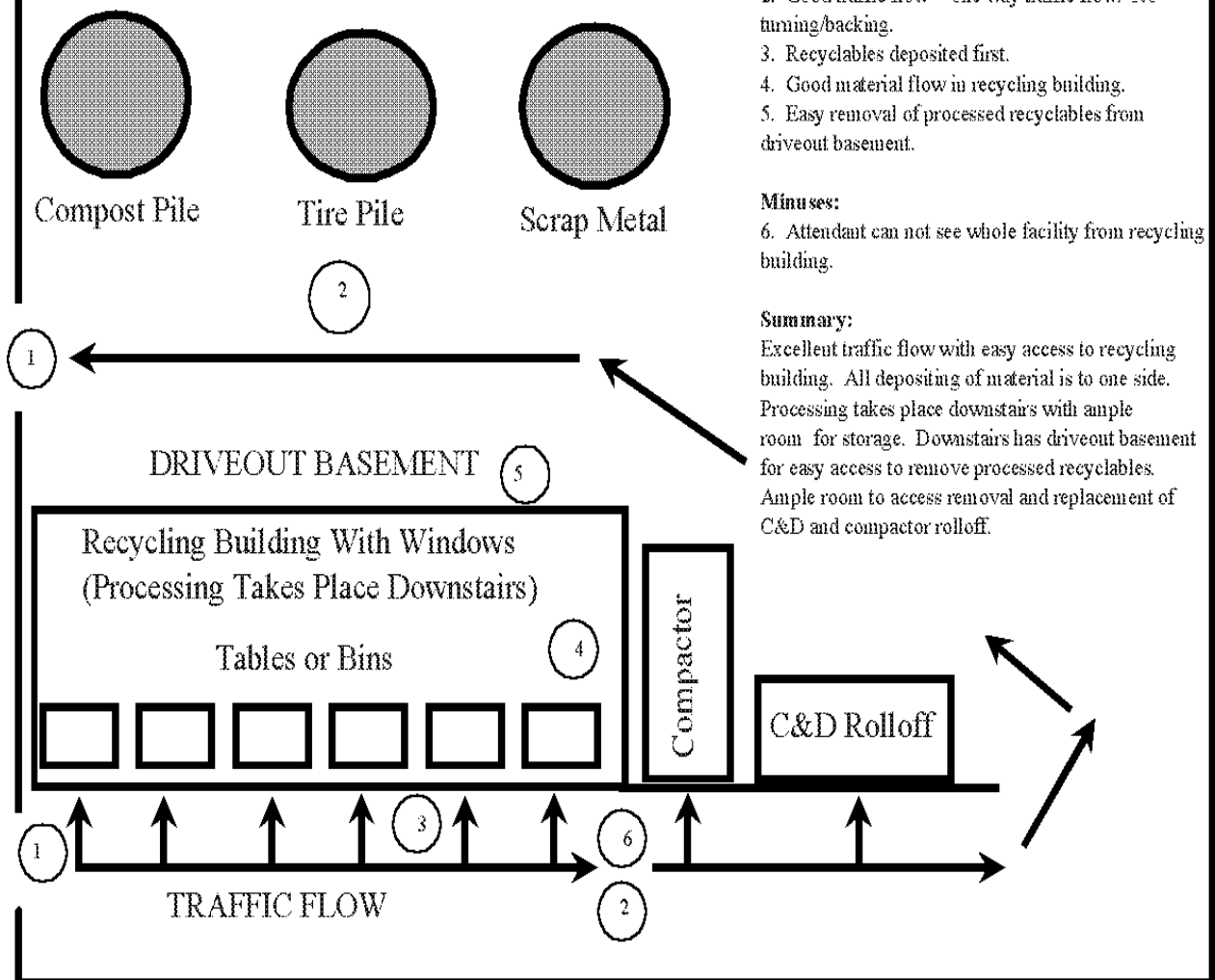
The flowchart illustrates the recycling process for C&D waste. It begins with a 'C&D Rolloff' area where waste is collected. From there, waste is transported to a 'Compactor' and then to a 'Burn Pile' for incineration. Alternatively, waste can be sent to a 'Scrap Metal' facility or a 'Compost' facility. The process also involves a 'Heated Recycling Building for Fibers' which contains 'Tables or Bins' and a 'Unheated Recycling Building'. Waste is processed through these buildings, with arrows indicating the flow of materials and numbered steps (1 through 8) representing different stages of the process.

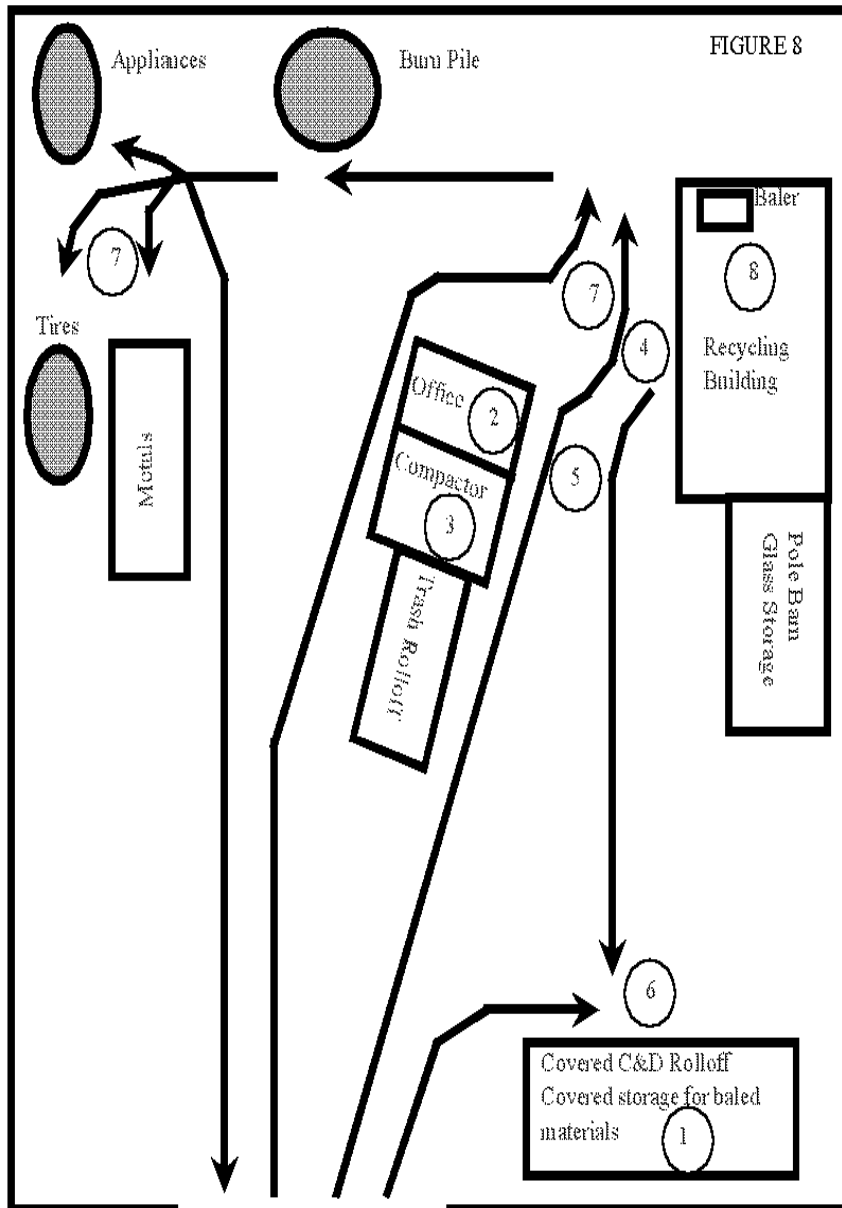
1. Circular traffic, no backups, no congestion.
2. Heated building for processing and storing fibers
3. Unheated building provides storage for containers- glass, tin, and aluminum.
4. Recyclables deposited first.
5. Adequate storage & processing space.
6. Room to add on.

7. Attendant can not see whole facility from recycling building.
8. Cross pedestrian traffic in area of recycling buildings.

This layout has excellent traffic flow with easy access to recycling buildings. Processing takes place in heated building with ample storage. Ample room to remove C&D rolloff and compactor.

FIGURE 7





**Pluses:**

1. Pole barn over C&D rolloff, inexpensive covered storage.
2. Entire facility visible from office.
3. Good access to compactor.

**Minuses:**

4. Recyclables deposited after trash.
5. Too little room for traffic flow.
6. Difficult access to C&D rolloff.
7. Congestion/in sufficient parking.
8. Poor access to baler; congestion and cramped storage space in recycling building.

**Summary:**

There is too little room for parking leading to congestion especially around the recycling building. Innovative storage space created for glass and baled materials. Good sight lines and access to compactor. Difficult access to baler in recycling building. Excessive handling required to move baled materials to storage.

## BUILDING DESIGN

**Design, Cost, and Efficiency.** The design of processing and storage buildings has a large impact on transfer station operations. Good design translates into efficient operation, and helps to minimize costs. Building size and design also affect options for adding recyclables, modifying processing capabilities, and accommodating community growth.

**Using Existing Structures.** If you are using existing structures, you will be limited by its size and layout. In addition, there are also other considerations that can affect the efficiency and cost of operations. For example:

- Can you expand the existing buildings?
- Do you have outdoors or other storage options to supplement existing storage space?
- Are there design features that limit or otherwise affect your plans for materials handling, processing, or storage?
- Are there several entrances to access the collected and processed materials?

**Materials Flow.** As much as possible, materials should flow directly from dropoff points, through short-term storage and processing space, to longer-term storage, and out your loading dock, with no backtracking or double handling. The more times you have to handle each material, the less efficient and more expensive your operations. If possible, take advantage of changes in elevation on your site by designing your facility so that residents drop trash down into a compactor, rolloff, or trailer. This will give you a safer, cleaner, more efficient operation.

**Dropoff of Recyclables.** Efficient dropoff simplifies materials handling, reduces contamination, and helps move residents through your facility. Many solid waste facilities use a row of clearly labeled windows on the outside of the recycling building(s). The residents deposit their recyclables through the windows onto sorting tables, or into gaylords or other containers. This is a very efficient dropoff option and allows the operator to sort the material before storage or processing.

Another method is to use covered rollofs with partitions. Each partitioned off section has an opening with a sign directing what recyclable should be deposited through each opening. The operator spot checks the rolloff during the day and removes any contaminants. This type of system does not require any buildings and only a minimum amount of work for the operator. However, the revenue for the recyclables will be low or may cost you because the recyclables are not baled and will need to be processed. In addition, you will be paying hauling charges for light loads.

**Secondary Sorting.** For almost all recyclable materials, it is important to conduct a second sort before the material is processed and stored. You need to plan adequate space for this operation (see Tables 1 and 2). If well supervised by the attendant, and if your market(s) have loose quality specifications, some materials -- e.g., tin and aluminum cans, mixed paper -- do not require a secondary sort, and can be deposited directly by residents into containers from which they will be processed or shipped. As a general rule, however, *all* materials should be considered to need a secondary sort, unless unusual considerations allow you to eliminate this step.

**Processing Space.** Layout and space required for processing depend on the materials you will collect and how you plan to move them to market. In general, you need adequate space to move materials into and out of balers, crushers, granulators, and other equipment. The more constricted your space, and the more you need to move one material out of the way before you can process another, the less efficient and more expensive your operations become.

A building 50 feet x 100 feet with 16-foot doors and ceilings is a good size for processing and some storage for many transfer stations, but the specifics of your program will dictate the exact size and layout of the building(s) you need. The exterior walls of the building should be made of concrete as high as possible to prevent damage by equipment and stored bales.

If you use a baler, plan to leave a clear space of about 400 square feet (about 20'x20') in front of the machine to give you room to load and unload. Once again, visiting other sites and

questioning their operators about the pluses and minuses of their facilities can provide excellent information as you design your own processing and storage space.

**Storage Space.** Adequate storage space is critical to efficient and cost-effective operations. If you do nothing else when you design your facility, *BUILD ENOUGH STORAGE SPACE!!* Be sure that you have space to store recyclables *before and after* they're processed, and provide easy access to bring in and remove all materials. Table 3 provides guidance on the volume of storage space needed to collect loose materials before baling. Storage space required for baled materials depends on the characteristics of specific balers and how frequently you ship materials. Consult with baler vendors to determine the size and weight of finished bales for different materials.

Storage options include inside storage space (including sturdy shelving to store baled materials off the floor), road-worthy or non road-worthy trailers (best if pulled up to a loading dock, to minimize materials movement), outdoor bunkers, rolloff containers, and open pole barns or other secondary buildings (see Table 4). Pole barns and other simple structures can often be built at very low cost using materials recovered from discarded construction and demolition wastes. Some communities use a spare baler for storage of bulky materials (e.g., cardboard, plastics), by adding and compacting additional volumes of the commodity in the baler until a full bale is produced. Sufficient loading docks (3 is good and 5 is better) should be planned and built to accommodate storage and marketing needs, including the possibility of future expansion.

Smaller towns may want to consider the possibility of cooperating to pool storage space in a common facility. This can relieve the storage requirements for individual communities, allow communities to collect marketable volumes of commodities more quickly, and possibly to realize better revenues for their recyclables.

**Future Expansion.** This can mean growth in your program as population expands or you bring in new customers (e.g., local businesses), or expanding the range of materials you collect. As

much as possible, build to accommodate this growth -- it is less expensive to overbuild today in anticipation of growth than to retrofit a completed structure. Whenever possible, collect and store clean wood and materials from the C&D pile which can be used to expand your facility at little or no cost.

**Other Design Considerations.** Local circumstances may create a need for special design considerations. For example, if commercial packer trucks will be bringing in trash, cardboard, or other materials, your doors and ceilings must be tall enough to accommodate them. If you plan a pole barn for outside storage of glass, be sure there's enough side and overhead clearance for a loader to pull out the glass for shipment. Install concrete pads to set your rolloffs on. If you use road-worthy trailers for storage, it's more efficient to back them up to loading docks than to have them sitting out elsewhere in your facility. Loading dock space is very important and should not be overlooked in the site design. Non road-worthy trailers can be used for storage at a facility without loading bays, if you remove the wheels and the front landing gear. You can set the trailer on timbers just off the ground, and load and unload without a high lift from the ground.

**Safety.** This is a critical feature of building design and use. Among the most important factors to consider are: keeping residents out of active processing areas and glass storage space; installing backup bells on moving equipment (skid steer loaders, forklifts, etc.); providing emergency shutoff switches and full safety guards on equipment such as balers and glass crushers; standardizing and enforcing safety procedures when operating processing equipment, torches, or welders; providing for efficient snow removal and preventing ice buildup; and using common sense precautions when materials are stored (for example, do not overstack bales, assure that shelves and other storage structures are sufficiently strong). In addition, operators should be familiar with and follow the *Universal Operating Requirements*, Section Env-Wm 2705 of the New Hampshire Solid Waste Rules.

For municipal solid waste facilities, Primex<sup>3</sup> formerly Compensation Funds of New Hampshire (1-800-698-2364) is available to conduct safety inspections and provide

assistance in designing and implementing safe operations programs for your facility.

**TABLE 3**

**GUIDELINES FOR PLANNING STORAGE SPACE FOR UNBALED MATERIALS**

**To use this table:** Use this table to calculate storage volumes for materials you will ship loose or baled. For baled materials, you need to know the approximate weight of a finished bale of each material. Get this information from the baler manufacturer or from other municipalities that use a similar baler. Once you can estimate the weight of a finished bale, work backwards to calculate the volume of storage space for loose material you'll need to make one bale.

**Example:** For PETE plastic, your baler will make a bale that weighs 600 pounds. Therefore, you must be able to store 600 pounds of loose PETE bottles before you can make a bale. From this table, 1 cubic yard of loose PETE bottles weighs about 30 pounds. Therefore you need about 20 cubic yards of storage space to collect 600 pounds of PETE before you can make a bale (600 lbs divided by 30 lbs/yd<sup>3</sup>). Twenty cubic yards times 27 equals 540 cubic feet (one cubic yard equals 27 cubic feet). This is an area of about 8 feet by 10 feet, and about 6 feet high.

Material	Volume and Storage Method	Weight
Newspaper	1 cubic yard <sup>1</sup> , loose, piled or in gaylords	600 lbs
Corrugated Cardboard	1 cubic yard, flattened	275 lbs
Office Paper	1 cubic yard, loose in gaylords	500 lbs
Glass	1 cubic yard, loose, whole bottles 1 cubic yard, manually broken 1 cubic yard, mechanically broken 1 55-gallon drum, loose, whole bottles 1 55-gallon drum, manually broken 1 55-gallon drum, mechanically broken	600 lbs 1,000 lbs 1,800 lbs 175 lbs 300 lbs 550 lbs
Tin (Steel) Cans	1 cubic yard, whole 1 cubic yard, flattened	150 lbs 850 lbs
Aluminum Cans	1 cubic yard, whole 1 cubic yard, flattened	75 lbs 250 lbs
PETE Plastic	1 cubic yard, whole 1 cubic yard, granulated	30 lbs 725 lbs
HDPE Containers	1 cubic yard, whole 1 cubic yard, flattened	25 lbs 50 lbs
Other Plastic (HDPE and other)	1 cubic yard, whole	50 lbs
Mixed Containers (Glass, Tin and Aluminum Cans,	1 cubic yard, whole	175 lbs

<b>Material</b>	<b>Volume and Storage Method</b>	<b>Weight</b>
Plastic Containers)		
Organic Materials		
Leaf/Yard Waste	1 cubic yard, uncomposted, uncompacted	250 lbs
Wood Chips	1 cubic yard	500 lbs
Grass Clippings	1 cubic yard	400 lbs
Construction/Demolition and Bulky Wastes	1 cubic yard, uncompacted 1 cubic yard, compacted (e.g., with loader bucket)	400 lbs 800 lbs

Note: <sup>1</sup> 1 cubic yard equals 27 cubic feet

**TABLE 4**  
**STORAGE OPTIONS FOR RECYCLABLE COMMODITIES**

TYPE OF STORAGE	SUITABLE MATERIALS	ADVANTAGES	DISADVANTAGES	COMMENTS
In-Building	<ul style="list-style-type: none"> <li>Any (except bulky items).</li> </ul>	<ul style="list-style-type: none"> <li>Most secure.</li> <li>Easy access to processing equipment.</li> <li>Typically most convenient for operators.</li> <li>Typically requires least materials handling.</li> </ul>	<ul style="list-style-type: none"> <li>Most expensive.</li> <li>Inflexible -- Once building completed, expensive to add to or modify storage space.</li> </ul>	<ul style="list-style-type: none"> <li>Constructing heavy duty shelves or pallet racks is an efficient utilization of overhead space.</li> <li>Some facilities hang large bags of loose plastics from ceilings before baling</li> </ul>
Road-Worthy Trailer	<ul style="list-style-type: none"> <li>Any (except bulky items).</li> <li>Can be used for storage of baled (post-processing) materials, materials stored loose in gaylords before shipping to markets (requiring no further processing), or loose materials awaiting baling or other processing</li> </ul>	<ul style="list-style-type: none"> <li>Relatively inexpensive.</li> <li>Secure.</li> <li>Materials can be moved directly to market without additional handling.</li> <li>If backed to loading dock, does not impose additional handling requirements.</li> <li>With some markets, materials not needing second sort can be deposited by residents directly into trailer (with operator supervision).</li> </ul>	<ul style="list-style-type: none"> <li>If away from loading dock, requires additional materials handling to load.</li> <li>Moving materials in confined space.</li> <li>Cost of registration, insurance, and maintenance.</li> <li>Need a fork truck or skid-steer loader to efficiently load a trailer.</li> </ul>	<ul style="list-style-type: none"> <li>Best if backed permanently to loading dock.</li> <li>Advantages are less if used elsewhere on site, requiring lifting of materials into trailer.</li> <li>Does the trailer need to be returned to the facility or is it "swappable"? Empty backhauls can be expensive.</li> </ul>

TYPE OF STORAGE	SUITABLE MATERIALS	ADVANTAGES	DISADVANTAGES	COMMENTS
Non Road-Worthy Trailer	Any	<ul style="list-style-type: none"> <li>• Least expensive.</li> <li>• Secure.</li> <li>• If backed to loading dock, easy to load and unload. Alternatively, removal of wheels and front landing gear allows easy access at ground level.</li> <li>• With some markets, materials not needing second sort can be deposited by residents directly into trailer (with operator supervision).</li> </ul>	<ul style="list-style-type: none"> <li>• Requires additional handling to unload for shipment.</li> <li>• If away from loading dock, requires additional materials handling to load.</li> <li>• Moving materials in a confined space.</li> <li>• Needs a fork truck or skid-steer loader to efficiently load and unload a trailer.</li> </ul>	
Rolloff Container: Covered	Any	<ul style="list-style-type: none"> <li>• Secure.</li> <li>• Materials can be moved directly to market without additional handling.</li> <li>• For materials not needing second sort (e.g., commingled containers, mixed paper), residents can drop directly into rolloff (with operator supervision)</li> <li>• Requires least materials handling.</li> </ul>	<ul style="list-style-type: none"> <li>• Markets must be willing to accept materials in this manner.</li> </ul>	<ul style="list-style-type: none"> <li>• Materials may be commingled if acceptable by market.</li> <li>• Should be placed on concrete pad</li> <li>• Provide adequate space for access by hauler's vehicle</li> <li>• Rental and/or rent-to-buy options available from many markets</li> </ul>

TYPE OF STORAGE	SUITABLE MATERIALS	ADVANTAGES	DISADVANTAGES	COMMENTS
Rolloff Container: Open-Topped	<ul style="list-style-type: none"> <li>Scrap Metal</li> <li>Bulky Items</li> <li>Commingled containers</li> </ul>	<ul style="list-style-type: none"> <li>Relatively inexpensive.</li> <li>Materials can be moved directly to market.</li> </ul>	<ul style="list-style-type: none"> <li>Materials are subject to rain, snow, etc. unless container parked under cover (e.g., in pole barn)</li> <li>Materials are not secure.</li> </ul>	<ul style="list-style-type: none"> <li>Should be placed on concrete pad.</li> <li>Provide adequate space for access by hauler's vehicle</li> <li>Rental and/or rent-to-buy options available from many markets</li> </ul>
Pole-Barn	<ul style="list-style-type: none"> <li>Any (except bulky items)</li> </ul>	<ul style="list-style-type: none"> <li>Relatively inexpensive.</li> <li>Easy access for depositing and processing.</li> <li>Secure.</li> <li>Materials are protected from the weather.</li> </ul>	<ul style="list-style-type: none"> <li>Inflexible -- Once building completed, must be added to or modified for more space.</li> </ul>	<ul style="list-style-type: none"> <li>Can be easily and rather inexpensively added to for more space.</li> </ul>
Outdoor Bunker	<ul style="list-style-type: none"> <li>Glass, metals, containers, tires, other materials not requiring protection from weather</li> </ul>	<ul style="list-style-type: none"> <li>Easy access.</li> <li>With supervision, residents can deposit some materials directly into bunker (e.g., glass for aggregate, tin cans, tires)</li> <li>Inexpensive.</li> </ul>	<ul style="list-style-type: none"> <li>Requires extra handling to process.</li> <li>Not protected from the weather.</li> <li>Not appropriate for materials requiring protection from weather</li> <li>Not secure.</li> </ul>	

TYPE OF STORAGE	SUITABLE MATERIALS	ADVANTAGES	DISADVANTAGES	COMMENTS
Outdoors, On Ground	<ul style="list-style-type: none"> <li>• Scrap metals and appliances</li> <li>• Glass for aggregate</li> <li>• Tires</li> <li>• Brush, compost</li> <li>• Some baled materials (not requiring protection from weather)</li> </ul>	<ul style="list-style-type: none"> <li>• Easy access.</li> <li>• Inexpensive.</li> </ul>	<ul style="list-style-type: none"> <li>• Not secure.</li> <li>• Not protected from the weather.</li> </ul>	<ul style="list-style-type: none"> <li>• Materials such as plastic must be covered to prevent exposure to sunlight.</li> <li>• Outdoor piles should be away from groundwater monitoring wells, poorly drained areas, etc.</li> <li>• Must be graded to direct runoff.</li> </ul>

## OPERATIONS

**Days and Hours.** The hours and days of operation should meet the needs of residents. This may require the facility to have evening hours one or more days a week. Open hours on weekends are also essential; these are generally the days when transfer facilities report their highest use. Communities with a sizeable number of summer residences may also find it best to plan a seasonal increase in operating hours to reduce congestion.

Scheduling operators' time can be a particular concern for larger facilities that are open five or six days per week. It can be difficult on staff if their schedules don't give them two consecutive days off each week, and equally demoralizing *never* to have an entire weekend off.

**Public Education.** All operators must be informed and trained to educate residents about sorting, recycling, fees, and material quality requirements. In addition, printed materials should be available explaining the program (e.g., reason for recycling, materials that are accepted, sorting and processing requirements, fees, etc.).

**Time for Processing.** As much as possible, processing and material handling equipment should not be operated when the facility is open to the public (unless the equipment is located in areas inaccessible to residents). Processing should be scheduled during separate hours or days. If processing must be scheduled when the facility is open, an operator should be devoted to each piece of operating machinery, with no conflicting responsibilities.

**Number of Operators.** The number of operators required to run a facility (including volunteers and "workfare" or other irregular employees) depends upon the number of people using the facility, the distribution and number of hours the facility is open, the number of materials processed, handling and processing procedures (e.g., whether materials are baled or stored loose), and the total quantity of materials processed (See Table 5). In addition, a layout with poor sight lines or large distances between different parts of the facility may require extra on-site operators whenever the facility is open to the public.

**Record Keeping.** A critical part of efficient facility operations is maintaining accurate and up to date records as required by the NH Solid Waste Rules. To do so, refer to the record keeping rules (Env-Wm 2705.09, 2705.10, 2805.06, 2805.07, 2805.13, 2805.14 and 2806) for guidance. The NH Solid Waste Rules can be obtain from the DES PIP office at (603) 271-2975 or through the DES website at: [www.des.state.nh.us](http://www.des.state.nh.us).

Records are useful in filling out the annual facility report that must be submitted by the owner/operator to DES by March 31<sup>st</sup> of the following year for the previous year's operations. In addition to staff hours, wages and benefits, and other personnel data, good records must be maintained on tonnages of all recyclables shipped and the dates they are sent to market, the identities of all markets, and the dates and amounts of payments received.

Other important records are the dates and quantities of trash sent for disposal, the names of hauler(s) and disposal facilities, and the date and amount paid for hauling and disposal. Finally, good maintenance records are important to assure the safety and long life of processing and handling equipment.

**Loading and Marketing Recyclables.** Bales and gaylords must be clearly labeled before they're shipped to assure that your municipality is properly credited by markets (especially if your materials will be mixed with those from other communities in a single trailer). Clear and accurate labeling is also critical if more than one community stores and ships materials from your facility. If you ship loads of mixed materials in a single trailer, you need to keep accurate records of the number of bales/gaylords of the different recyclables.

Loading is a critical operation, and should be scheduled when the facility is closed to the public. Check with markets regarding loading requirements, and assure that you have the equipment on hand to load their vehicles (for example, a forklift or skid-steer loader is needed to efficiently load a box trailer). You can be penalized if your loading operations take too long and interfere with the haulers' schedule.

**Operator Certification and Training.** All professional facility operators must be certified by the New

Hampshire Department of Environmental Services (contact: 271-2928), and must maintain state certification by attending one or more operator training workshop each year. The annual workshop schedule is mailed to every New Hampshire solid waste facility and to all certified facility operators in January of each year. The schedule can also be found on the DES website at: [www.des.state.nh.us/pcas](http://www.des.state.nh.us/pcas).

Whenever your facility is open to the public, a minimum of half of all on-site workers who are directly involved in managing solid waste (including recyclables) must be DES certified operators.

**Safety.** Safety is a critical factor in all aspects of facility operations. Operators should be trained in the use of all equipment they will be operating, equipment should be well maintained, and protective devices and emergency cutoffs should be in place and functioning properly. In addition, operators should be familiar with a contingency plan with operating procedures for response to emergency conditions, including fire, explosion, and personal injury. Operators should be aware of the hazards that can be found in bags of trash and recyclables, such as razors, syringes, and broken glass, and should take appropriate precautions (e.g., heavy gloves, eye protection). Floors should be kept dry and debris free; materials should be stored so that they cannot fall; driveways and passageways should be kept clear; and materials should be handled and stored in ways that minimize manual lifting.

Residents should be physically separated from all operating machinery, and if possible, processing machinery should be operated only when the facility is closed to residents. Safety training is provided through the Waste Management Division's operator certification program. Additional training can be obtained through equipment manufacturers and dealers, the Primex<sup>3</sup> (formerly Compensation Funds of New Hampshire), or other sources.

**Publicity.** Whenever anything good is happening at the transfer station/recycling center, get it in the local newspaper and the town report. Also post signs showing how much of each material is being recycled, how much of the waste stream is being diverted from disposal, and how much money taxpayers are saving through cost avoidance and marketing recyclables. In addition, give presentations at schools and civic organizations on how to reduce, reuse, and recycle waste.

**Aesthetics.** A final, but very important operating factor is the aesthetics of the facility. A clean, neat, odor and pest free facility encourages residents to bring their solid waste to the facility, encourages them to linger and become familiar with your operations, and demonstrates clearly your commitment to running an efficient solid waste operation. Some of the ways to improve the aesthetics of your facility is to routinely mow the grass, don't let trash or recyclables accumulate, plant flowers, and keep building(s) and equipment painted.

**Annual Facility Report.** Each solid waste facility in New Hampshire is required to file an annual report of its operations with the DES Waste Management Division by March 31 of each year for the prior year's operations. These reports are sent to facility owners in February of each year and are also available on the DES website at: [www.des.state.nh.us/pcas](http://www.des.state.nh.us/pcas). For most municipal facilities, reports are sent to the select board or city council. Facility operators should be sure that the reports are passed along to them to be completed accurately.

**TABLE 5**  
**NUMBER OF OPERATORS AT REPRESENTATIVE TRANSFER/RECYCLING CENTERS**

<b>Number of Residents Using Facility</b>	<b>Processing Carried Out at Facility</b>	<b>Number of Operators</b>
3,000	Extensive -- Long list of recyclables accepted; all materials processed on site; processes some commercial recyclables	4 full-time
3,200	Intermediate -- Some materials fully processed; some marketed as dropped off by residents	1 full-time / 1 part-time / Some volunteer help
4,200	Extensive -- All materials processed on site	2 full-time / 1 part-time
4,400	Extensive -- All materials processed on site	3 full-time
6,400	Minimal -- Recyclables collected and shipped commingled	2 full-time / Part-time help as needed
10,000	Extensive -- Commingled containers sorted on site; other materials also processed on site	5 full-time
22,000	Extensive -- Commingled containers sorted on site; other materials also processed on site; processes some commercial recyclables	4-6 full-time processing / 2 full-time administrative

## COSTS

There are two sets of costs to consider when planning a solid waste facility:

- **Capital costs** are costs of purchasing (or leasing) a site, doing the site work, buying and erecting structures, and purchasing equipment and other durable items needed to operate the facility.

A number of grant awarding agencies in New Hampshire may be able to provide assistance in financing the capital costs of your program. These include New Hampshire the Beautiful, the Wal-Mart Foundation, the Kmart Fund, and others. A listing of such programs is available from the DES Planning and Community Assistance Section (271-1749). Ask for the document, *N.H. Grant Opportunities for Recycling and Solid Waste Management*. Information on grants is also available on the DES website at: [www.des.state.nh.us/pcas](http://www.des.state.nh.us/pcas).

- **Facility operating costs** are costs incurred each year to run the facility and handle materials -- they include, for example, personnel salaries and benefits, public education, administrative costs, equipment operating and maintenance costs, insurance, fuel, and electricity, as well as hauling and disposal costs for trash. In addition, the operating portion of your budget includes costs to process and transport recyclables to markets.

Revenues from marketing recyclables should not be included in your budget because they are too unpredictable and can raise unrealistic expectations about the financial benefits of recycling. A possible exception is when you have a contract with a floor price; in this case revenues based on the floor price and the material quantities you expect to recycle can be incorporated into the budget.

## FULL COST ACCOUNTING

“Full Cost Accounting” means identifying and including in your budget calculations all of the direct and indirect costs associated with providing a service or program.

**Direct Costs.** Direct costs are the expenditures that are clearly and directly attributable to your solid waste program and the services it provides. They include, for example: salaries, wages, and benefits for facility staff; capital and operating costs for buildings and equipment; MSW hauling and disposal costs; fuel and electricity; outside contractors; and recycling collection and processing costs.

**Indirect Costs.** Indirect costs represent services that are provided to the solid waste program by other municipal departments. They generally relate to administrative services shared by a number of departments, such as city administration (e.g., town manager’s time spent on solid waste), central purchasing, finance, legal, and personnel functions, and accounting, billing, and payroll services. These can add up to a surprisingly large proportion of total MSW management costs -- surprising because most solid waste managers have considered these to be free municipal services, and have never considered them part of the solid waste budget.

**The Importance of Full Cost Accounting.** Adopting an accounting system that tracks all of these costs and brings them into the solid waste budget approaches the ideal of managing your transfer station as an independent enterprise. If it is possible in your community, establishing a separate enterprise fund or other independent accounting system for the transfer station/recycling center is an excellent way to set up the program as a self-standing municipal enterprise. Even if establishing this level of independence is not feasible, maintaining a full-cost accounting system for your program will allow you to prepare a more meaningful and accurate budget, and to better track and manage all of the costs and revenues related to solid waste and recycling. The EPA has developed a handbook that presents the key concepts and benefits of full cost accounting, along with describing the steps involved in implementing full cost accounting program. The handbook is found on the EPA website at: <http://www.epa.gov/fullcost/docs/epadocs.htm#fcahandbook>

## CAPITAL COSTS

**Land Purchase.** This cost can vary greatly between communities. Capital costs for land purchase can be reduced by using a site already owned by the municipality or a site donated to the municipality.

**Site Preparation.** Costs for site preparation (e.g., ramp and road construction, fencing, retaining walls, etc.) will depend upon site size, topography, and layout. Savings can be obtained by having municipal employees and equipment do some or all of the work.

**Building Costs.** Building costs depend on the number, size, and design of new or renovated buildings. Using existing structures as fully as possible, purchasing and relocating existing structures or having a tech school build some or all structures can reduce the costs. In addition, municipal employees and volunteers may be used to help erect structures. Landscaping and painting are also cost areas where volunteers can be used to reduce capital expenses.

**Equipment Costs.** These costs depend on the materials you will handle and your plans for processing and marketing. Among the items you may need are a trash compactor, baler, used oil furnace, glass crusher, plastic densifier or granulator, conveyors, a skid-steer loader or forklift or front end loader, and rollofs and/or box trailers for storage.

Many options are available to save money. A municipality can rent or lease some equipment (e.g., compactors, rollofs), negotiate with markets to leave rollofs or storage trailers on site, purchase government surplus or other used equipment, share equipment with other municipal departments (e.g., loader, plow, forklift), or manufacture its own equipment (e.g., glass crusher). The state and federal governments both maintain surplus equipment warehouses in Concord. Contact 271-3241 for information about state surplus sales, or 271-2602 for information about federal surplus.

**Bond Payments.** If municipal (or other) bonds are used to finance your facility and/or equipment, bond payments are a fixed capital cost, determined by the amount borrowed, the interest rate, and the length of time over which repayment is scheduled. The details of bonding for construction or equipment should be worked out in close cooperation with the municipal budget committee, select

board, and legal counsel. Any options that reduce the capital cost of your facility (e.g., using existing structures, purchasing used equipment, leasing or renting equipment, etc.) will reduce the amount that must be financed by borrowing, and so reduce annual bond payments.

If a transfer station or recycling center is being constructed to replace a local landfill, a municipality may be able to access the Department of Environmental Services' **State Revolving Loan Fund** (SRF), which can finance loans significantly below commercial interest rates. Call (603) 271-3448 for additional information.

## **OPERATING COSTS**

**Labor Costs.** Manpower needs and the number of people using the facility, open hours, the number of materials and total quantities handled, and the extent to which recyclables are handled and processed determines associated costs. Labor costs can be reduced by hiring part-time workers, special needs individuals, or people on public assistance, and/or by using volunteer assistants. Contact your insurance carrier to determine which workers have to be covered by Worker's Compensation and which ones do not. Remember that, during operating hours, 50% of on-site personnel who are directly involved in the management of solid waste must be certified as facility operators by the NHDES.

**Fuel Costs.** Fuel costs can be minimized through competitive bids (typically through the municipal public works department). Heating only those spaces actively used for processing and using unheated space for material storage can also control fuel costs. Such considerations should be incorporated into site and building design. In addition, a used oil furnace can be used to heat transfer station buildings (or other municipal facilities). For information on the state used oil grant program, visit the DES website at: [www.des.state.nh.us/hwcs/used-oil.htm](http://www.des.state.nh.us/hwcs/used-oil.htm) or call 1-888-TAKE OIL (825-3645)

**Utility Costs.** Utility costs can be controlled by installing energy efficient lighting, and by considering power usage as part of all equipment purchase decisions.

**Hauling and Tipping Contracts.** Contracts for nonrecyclable waste hauling and disposal should be awarded through competitive bids. Some contractors' offer only hauling, some offer only disposal, while others offer a service that includes both. Be sure you are comparing similar services.

It may not always be in the municipality's best interest to accept the lowest bid. Among other important factors that should affect contractor selection are quality and reliability of service (demonstrated by references from other communities), and flexibility to negotiate changes in contract terms (either in response to changing market conditions, or to accommodate special community needs).

**Transporting and Marketing Recyclables.** Several options are available. One option is to market recycled material through a broker who can arrange the sale and transportation of recycled commodities. Another option is to become a member of the *Northeast Resource Recovery Association (NRRA)*, a nonprofit membership organization of over 150 municipalities that manages cooperative marketing contracts for nearly all recycled commodities (including commingled recyclables). Some communities play *spot markets* by contacting markets directly and selling their recyclables for the highest current price. Others establish their own *short- or long-term contracts* with markets, either by negotiation or competitive bids. In all cases, the municipality should not begin collecting material before knowing the processing requirements and material quality specifications of the broker/market that will be purchasing the recyclables.

**Rental Fees.** Rental or lease fees will vary depending upon the length of the rental agreement and the size and type of equipment rented. The equipment most generally rented includes compactors, rolloffs, and trailers. Another item rented by many communities is a portable toilet, saving the cost of installing a septic system or connecting to the local sewer.

**Maintenance.** Regular maintenance on equipment extends its working life and reduces down time, more than repaying the associated expense. In addition to equipment, transfer station buildings, grounds, and signs should be well maintained and repainted as necessary -- not only to enhance site

safety and extend the working life of your facility, but to encourage residents to use the facility and demonstrate your own commitment to a high quality solid waste program.

## MARKETING THE PLAN

It is critical to gain wide public support for all aspects of your facility and materials handling plans before you break earth or handle your first pound of material. A well-informed and supportive public can be transformed into strong supporters of your program who will work with you to recycle aggressively and minimize program costs. On the other hand, if you attempt to work in a vacuum, without strong public support, your program may suffer from continuing opposition to your budget, recycling program, and/or facility plans and operations.

**Who Should Market the Plan?** *ALL* local officials and residents who work to develop the transfer station / recycling center plan should be unified and active in marketing the plan to the wider community. These include elected officials, public works department management and employees, and members of civic groups and/or any solid waste or recycling committee involved in the plan.

**Who To Market The Plan To?** *Residents* should be brought into the planning and education process early on. This can be done through public meetings, mailings, pamphlets, brochures, newspaper articles, presentations in schools, and direct contact (e.g., at the town solid waste facility).

The *Commercial/Industrial Community* has a financial interest in how solid waste is handled in the municipality, especially if they are excluded from using the proposed facility or are restricted in the amounts they can bring to the facility. Since they pay property taxes, they can be very vocal in expressing their financial concerns to municipal officials.

*Civic Groups* (Chamber of Commerce, Rotary, Kiwanis, Men's Club, Women's Club, etc.) represent concerned and involved citizens who can be extremely helpful in supporting the municipality's solid waste plan.

*Schools* can be an important target of your marketing strategy. The messages and enthusiasm students take home with them can have a large impact in bringing their parents along as supporters of your waste management and recycling plans.

**Points To Make About The Plan.** If you have reached the point of presenting the plan to the community, stress the positive benefits that support the plan. These may include:

- Economic benefits, including cost avoidance and how your budget works to minimize capital and operating costs.
- Possible revenues from marketing your recyclables. (Presented as frosting on the cake)
- Environmental benefits such as recycling, reducing wastes destined for disposal, and removing toxic materials from the waste stream.
- Ease of use for residents.
- Success stories from other municipalities with similar facilities and/or programs.

**Other Issues.** When you present and discuss the plan, you can predict a number of issues that may be raised by local residents. These include:

- The impact on property taxes. This may be a concern to many citizens, especially if you are closing a landfill at the same time you open a new transfer station / recycling center. You should be prepared to answer candidly, based on your capital and operating budgets. (A Department of Environmental Services publication, *“Local Economic Impacts of Landfill Closure and Municipal Solid Waste Management,”* Publication No. NHDES-WMD-95-02 may help in addressing these concerns.)
- Some residents may question the projected revenues the municipality will receive for its recyclables. To begin with, your plan, budget, and marketing strategy should focus on money saved through avoided costs, and not on the revenues generated from your recyclables. To respond to questions about revenues, however, the more you know about markets and the better your preparation to market your recyclables, the better your answers will be. Current market information is available from DES (contact: 271-3712), the Governor’s Recycling Program (contact: 271-1098); the “Blue Sheet” published by New Hampshire the Beautiful (contact: 444-9812), or (for members) the Northeast Resource Recovery Association (contact: 798-5777).
- Residents may question the amount of recyclables and/or nonrecyclable trash generated by the municipality. If it is possible, this concern can be best addressed by doing a local waste analysis during development of the plan. Information on trash generation and the recycling rates you can expect to achieve can also be obtained from DES, the Governor’s Recycling Program, or by contacting nearby municipalities directly to discuss their experiences with programs similar to

yours.

- Some residents may question the need to recycle **any** materials. Your plan and budget should be able to demonstrate total program costs with and without recycling, and show the local economic advantages of pursuing your proposed recycling program.

**Changing The Plan.** If you have done your homework and educated residents, the commercial/industrial community, and the local civic groups -- and adjusted your plan to respond to their suggestions and concerns -- approval of the plan and budget at town meeting or by the city council should be a formality. Over time, as you (and your residents) gain familiarity and experience with your facility and operations, recycling markets, negotiating with vendors, and the many other aspects of operating a transfer station and recycling program, adjustments can be made in materials handling and processing, facility operations, and aspects of your layout and design to increase the efficiency of your program and bring additional savings to your bottom line.

## **WORKSHEETS**

**WORKSHEET 1**  
**EVALUATING PROCESSING, STORAGE, AND MARKETING OPTIONS FOR RECYCLABLE COMMODITIES**

<b>MATERIAL</b>	<b>MARKETS</b>	<b>SORTING</b>	<b>PROCESSING</b>	<b>STORAGE</b>
Aluminum Cans	Name: _____ _____ <input type="checkbox"/> Separated from steel (tin) cans <input type="checkbox"/> Comingled with steel (tin) cans <input type="checkbox"/> Comingled with all other containers (glass, plastic, steel cans)	<input type="checkbox"/> Collected separately from steel (tin) cans <input type="checkbox"/> Collected and marketed comingled with steel (tin) cans <input type="checkbox"/> Collected with steel (tin) cans; separated magnetically on site <input type="checkbox"/> Collected and marketed comingled with all other containers	<input type="checkbox"/> Loose / gaylords <input type="checkbox"/> Loose / rolloff or dumpster <input type="checkbox"/> Baled <input type="checkbox"/> Other: _____ _____	<input type="checkbox"/> Indoors, recycling building <input type="checkbox"/> Outdoors under cover (e.g., pole barn) <input type="checkbox"/> Rolloff or dumpster
Appliances (Frequent fee item <sup>1</sup> )	Name: _____ _____	Not Applicable	<input type="checkbox"/> CFCs removed from refrigerators, air conditioners (mandatory)	<input type="checkbox"/> On ground, separated from other metal until CFCs removed <input type="checkbox"/> Other: _____ _____
Automotive Batteries	Name: _____ _____	Not Applicable	Not Applicable	<input type="checkbox"/> In recycling building <input type="checkbox"/> Other: _____ _____
Brush	<input type="checkbox"/> Burn pile <input type="checkbox"/> Chipped, use by residents <input type="checkbox"/> Chipped, town use <input type="checkbox"/> Chipped, compost bulking agent <input type="checkbox"/> Not accepted at facility	Not Applicable	<input type="checkbox"/> Burned <input type="checkbox"/> Chipped	<input type="checkbox"/> Burn pile <input type="checkbox"/> Stored in pile before and after chipping

**WORKSHEET 1**  
**EVALUATING PROCESSING, STORAGE, AND MARKETING OPTIONS FOR RECYCLABLE COMMODITIES**

<b>MATERIAL</b>	<b>MARKETS</b>	<b>SORTING</b>	<b>PROCESSING</b>	<b>STORAGE</b>
Construction/Demolition (Frequent fee item <sup>1</sup> )	Name: _____ _____	<input type="checkbox"/> None: All C&D mixed <input type="checkbox"/> Some wastes separated for independent marketing (e.g., shingles, clean wood, clean wallboard). Describe separation: _____ _____ _____	Very rarely applicable	<input type="checkbox"/> Rolloff <input type="checkbox"/> Other: _____ _____ _____ _____
Tires (Frequent fee item <sup>1</sup> )	Name: _____ _____	Not Applicable	Not Applicable	<input type="checkbox"/> Outdoor piles <input type="checkbox"/> Trailer <input type="checkbox"/> Rolloff <input type="checkbox"/> Other: _____ _____
Corrugated Cardboard (OCC)	Name: _____ _____	<input type="checkbox"/> Secondary sort needed Describe market requirements: _____ _____ _____  <input type="checkbox"/> No secondary sort (material deposited with operator supervision)	<input type="checkbox"/> Baled <input type="checkbox"/> Loose / gaylords <input type="checkbox"/> Loose / trailer <input type="checkbox"/> Loose / covered rolloff <input type="checkbox"/> Other: _____	<input type="checkbox"/> Indoors <input type="checkbox"/> Trailer <input type="checkbox"/> Covered rolloff <input type="checkbox"/> Other: _____

**WORKSHEET 1**  
**EVALUATING PROCESSING, STORAGE, AND MARKETING OPTIONS FOR RECYCLABLE COMMODITIES**

<b>MATERIAL</b>	<b>MARKETS</b>	<b>SORTING</b>	<b>PROCESSING</b>	<b>STORAGE</b>
Other Plastics	Name: _____ _____	<input type="checkbox"/> Plastics deposited in separate bins by residents. Secondary sort to verify correct separation. <input type="checkbox"/> Residents deposit into single mixed bin or container. Facility staff sort by number and eliminate unacceptable plastics.	<input type="checkbox"/> Baled <input type="checkbox"/> Densified <input type="checkbox"/> Loose / gaylords <input type="checkbox"/> Loose / rolloff or dumpster <input type="checkbox"/> Other: _____	<input type="checkbox"/> Indoors, recycling building <input type="checkbox"/> Outdoors under cover (e.g., pole barn) <input type="checkbox"/> Rolloff or dumpster (covered)
Pigmented HDPE containers	Name: _____ _____ <input type="checkbox"/> Separated from other containers <input type="checkbox"/> Comingled with other containers	<input type="checkbox"/> Secondary sort to remove unacceptable plastics (typical unless marketed comingled with other containers) <input type="checkbox"/> Sorted from other containers on site	<input type="checkbox"/> Baled <input type="checkbox"/> Granulated <input type="checkbox"/> Densified <input type="checkbox"/> Loose / gaylords <input type="checkbox"/> Loose / rolloff or dumpster <input type="checkbox"/> Other: _____ _____	<input type="checkbox"/> Indoors, recycling building <input type="checkbox"/> Outdoors under cover (e.g., pole barn) <input type="checkbox"/> Rolloff or dumpster (covered)
Translucent (Clear) HDPE (Milk jugs)	Name: _____ _____ <input type="checkbox"/> Separated from other containers <input type="checkbox"/> Comingled with other containers	<input type="checkbox"/> Secondary sort to remove unacceptable plastics (typical unless marketed comingled with other containers) <input type="checkbox"/> Sorted from other containers on site	<input type="checkbox"/> Baled <input type="checkbox"/> Granulated <input type="checkbox"/> Densified <input type="checkbox"/> Loose / gaylords <input type="checkbox"/> Loose / rolloff or dumpster <input type="checkbox"/> Other: _____ _____	<input type="checkbox"/> Indoors, recycling building <input type="checkbox"/> Outdoors under cover (e.g., pole barn) <input type="checkbox"/> Rolloff or dumpster (covered)

**WORKSHEET 1**  
**EVALUATING PROCESSING, STORAGE, AND MARKETING OPTIONS FOR RECYCLABLE COMMODITIES**

MATERIAL	MARKETS	SORTING	PROCESSING	STORAGE
PETE	Name: _____ _____ <input type="checkbox"/> Comingled with other containers <input type="checkbox"/> Color separated <input type="checkbox"/> Not separated by color	<input type="checkbox"/> Secondary sort to remove unacceptable plastics (typical unless marketed comingled with other containers) <input type="checkbox"/> Sorted from other containers on site	<input type="checkbox"/> Baled <input type="checkbox"/> Densified <input type="checkbox"/> Loose / gaylords <input type="checkbox"/> Loose / rolloff or dumpster <input type="checkbox"/> Other: _____ _____	<input type="checkbox"/> Indoors, recycling building <input type="checkbox"/> Outdoors under cover (e.g., pole barn) <input type="checkbox"/> Rolloff or dumpster (covered)
Glass	<b>Cullet:</b> Name: _____ _____  <b>Aggregate:</b> <input type="checkbox"/> Local use <input type="checkbox"/> Other. Name: _____ _____ _____	<b>Cullet:</b> (Only container glass acceptable)  <input type="checkbox"/> Secondary sort necessary <b>Colors:</b> <input type="checkbox"/> Clear, brown, green separated <input type="checkbox"/> Clear separated; brown/green mixed <input type="checkbox"/> Three colors mixed  <b>Aggregate:</b> (Secondary sort unnecessary; non-container glass acceptable)	<b>Cullet:</b> <input type="checkbox"/> Crushed / glass crusher <input type="checkbox"/> Partially crushed / loader or other equipment <input type="checkbox"/> Whole <input type="checkbox"/> Whole, comingled with other containers  <b>Aggregate:</b> <input type="checkbox"/> Crushed, home-built crusher <input type="checkbox"/> Crushed, purchased crusher <input type="checkbox"/> Transported uncrushed for off site processing	<b>Cullet:</b> <input type="checkbox"/> Indoors / recycling bldg <input type="checkbox"/> Indoors / pole barn or other covered structure <input type="checkbox"/> Rolloff; separate rolloff for each color <input type="checkbox"/> Rolloff with separate compartments for different colors <input type="checkbox"/> Rolloff, comingled with other containers <input type="checkbox"/> Outdoors, bunkers  <b>Aggregate:</b> <input type="checkbox"/> Outdoors, bunker <input type="checkbox"/> Outdoors, pile <input type="checkbox"/> Indoors, recycling building <input type="checkbox"/> Indoors / pole barn or other covered structure

**WORKSHEET 1**  
**EVALUATING PROCESSING, STORAGE, AND MARKETING OPTIONS FOR RECYCLABLE COMMODITIES**

<b>MATERIAL</b>	<b>MARKETS</b>	<b>SORTING</b>	<b>PROCESSING</b>	<b>STORAGE</b>
Newspaper	Name: _____ _____	<input type="checkbox"/> Secondary sort needed Describe market requirements: _____ _____ _____  <input type="checkbox"/> No secondary sort (material deposited with operator supervision)	<input type="checkbox"/> Baled <input type="checkbox"/> Loose / gaylords <input type="checkbox"/> Loose / trailer <input type="checkbox"/> Loose / covered rolloff <input type="checkbox"/> Other: _____	<input type="checkbox"/> Indoors <input type="checkbox"/> Trailer <input type="checkbox"/> Covered rolloff <input type="checkbox"/> Other: _____
Mixed Paper	Name: _____ _____	<input type="checkbox"/> Secondary sort needed Describe market requirements: _____ _____ _____  <input type="checkbox"/> No secondary sort (material deposited with operator supervision)	<input type="checkbox"/> Loose / gaylords <input type="checkbox"/> Loose / trailer <input type="checkbox"/> Loose / covered rolloff	<input type="checkbox"/> Indoors <input type="checkbox"/> Trailer <input type="checkbox"/> Covered rolloff <input type="checkbox"/> Other: _____
Used Motor Oil	Name: _____ _____  <input type="checkbox"/> Local use (space heat)	Check for contaminants	Not Applicable	<input type="checkbox"/> 55 gallon drums <input type="checkbox"/> Tank(s)

**WORKSHEET 1**  
**EVALUATING PROCESSING, STORAGE, AND MARKETING OPTIONS FOR RECYCLABLE COMMODITIES**

<b>MATERIAL</b>	<b>MARKETS</b>	<b>SORTING</b>	<b>PROCESSING</b>	<b>STORAGE</b>
Magazines	Name: _____ _____ <input type="checkbox"/> Marketed as separate paper grade <input type="checkbox"/> Collected and marketed as component of mixed paper	<input type="checkbox"/> Secondary sort needed Describe market requirements: _____ _____ _____	<input type="checkbox"/> With mixed paper <input type="checkbox"/> Loose / gaylords <input type="checkbox"/> Loose / trailer <input type="checkbox"/> Loose / covered rolloff	<input type="checkbox"/> Indoors <input type="checkbox"/> Trailer <input type="checkbox"/> Covered rolloff <input type="checkbox"/> Other: _____
Office Paper	Name: _____ _____ <input type="checkbox"/> Marketed as separate paper grade <input type="checkbox"/> Collected and marketed as component of mixed paper	<input type="checkbox"/> Secondary sort needed Describe market requirements: _____ _____ _____	<input type="checkbox"/> With mixed paper <input type="checkbox"/> Loose / gaylords <input type="checkbox"/> Loose / trailer <input type="checkbox"/> Loose / covered rolloff	<input type="checkbox"/> Indoors <input type="checkbox"/> Trailer <input type="checkbox"/> Covered rolloff <input type="checkbox"/> Other: _____

**WORKSHEET 1**  
**EVALUATING PROCESSING, STORAGE, AND MARKETING OPTIONS FOR RECYCLABLE COMMODITIES**

<b>MATERIAL</b>	<b>MARKETS</b>	<b>SORTING</b>	<b>PROCESSING</b>	<b>STORAGE</b>
Tin (steel) Cans	Name: _____ _____  <input type="checkbox"/> Separated from aluminum cans <input type="checkbox"/> Comingled with aluminum cans <input type="checkbox"/> Comingled with all other containers (glass, plastic, aluminum cans)  <b>Aerosol cans:</b> <input type="checkbox"/> Included <input type="checkbox"/> Excluded  <b>Paint cans (air dried):</b> <input type="checkbox"/> Included <input type="checkbox"/> Excluded	<input type="checkbox"/> Collected separated from aluminum can <input type="checkbox"/> Collected and marketed comingled with aluminum cans <input type="checkbox"/> Collected with aluminum cans; separated magnetically on site <input type="checkbox"/> Collected and marketed comingled with all other containers	<input type="checkbox"/> Loose / gaylords <input type="checkbox"/> Loose / rolloff or dumpster <input type="checkbox"/> Baled <input type="checkbox"/> Other: _____ _____	<input type="checkbox"/> Indoors, recycling building <input type="checkbox"/> Outdoors under cover (e.g., pole barn) <input type="checkbox"/> Rolloff or dumpster (covered)
Scrap Metal	Name: _____ _____	<input type="checkbox"/> None <input type="checkbox"/> Nonferrous metals separated from iron and steel	<input type="checkbox"/> None <input type="checkbox"/> Other: _____ _____	<input type="checkbox"/> Outdoors, pile <input type="checkbox"/> Rolloff

**WORKSHEET 1**  
**EVALUATING PROCESSING, STORAGE, AND MARKETING OPTIONS FOR RECYCLABLE COMMODITIES**

<b>MATERIAL</b>	<b>MARKETS</b>	<b>SORTING</b>	<b>PROCESSING</b>	<b>STORAGE</b>
Textiles	Name: _____ _____ <input type="checkbox"/> Swap shop	<input type="checkbox"/> Some sorting performed (rarely necessary)	<input type="checkbox"/> Baled <input type="checkbox"/> Bagged <input type="checkbox"/> None	<input type="checkbox"/> Swap shop until taken by resident or discarded <input type="checkbox"/> Indoors, recycling building <input type="checkbox"/> Weatherproof container, provided by municipality (e.g., trailer) <input type="checkbox"/> Weatherproof container, provided by market (e.g., Goodwill or Salvation Army box)
Leaf and Yard Waste	<input type="checkbox"/> Burn Pile <input type="checkbox"/> Compost <input type="checkbox"/> Piled, then taken away by residents <input type="checkbox"/> Not accepted at facility	<input type="checkbox"/> Residents must remove from bags <input type="checkbox"/> If residents bring bagged trimmings, facility staff open bags	<input type="checkbox"/> Burned <input type="checkbox"/> Compost pile/ windrow <input type="checkbox"/> None (residents remove from pile)	<input type="checkbox"/> Burn pile <input type="checkbox"/> Compost pile <input type="checkbox"/> Stockpile for residential use

Note: <sup>1</sup>Many facilities charge a fee to residents to cover disposal cost of these items. Fees charged per unit (tires, appliances) or per volume discarded (construction/demolition).

## WORKSHEET 2

### SITE, BUILDING, AND OPERATIONS PLANNING AND DESIGN CHECKLIST

DESIGN AREA	DESIGN/OPERATING CONSIDERATION
<b>SITE PLANNING AND LAYOUT</b>	
Permits	<input type="checkbox"/> State solid waste facility permit <input type="checkbox"/> Local planning and/or zoning approvals <input type="checkbox"/> Wetlands (if applicable) <input type="checkbox"/> Alteration of terrain (if applicable)
Layout	<input type="checkbox"/> Plan addresses most crowded day <input type="checkbox"/> 50 foot setback from property lines <input type="checkbox"/> One-way traffic flow <input type="checkbox"/> Recyclables deposited first, trash for disposal deposited last <input type="checkbox"/> Pedestrian crossing of traffic lanes minimized or eliminated <input type="checkbox"/> Good use made of existing changes in elevation <input type="checkbox"/> Sharp/blind turns, backing up minimized or eliminated <input type="checkbox"/> Ample space for access to all storage and processing areas <ul style="list-style-type: none"> <li><input type="checkbox"/> Recycling building(s)</li> <li><input type="checkbox"/> Trash compactor</li> <li><input type="checkbox"/> C&amp;D rolloff</li> <li><input type="checkbox"/> Compost pile</li> <li><input type="checkbox"/> Brush pile</li> <li><input type="checkbox"/> Scrap metal</li> <li><input type="checkbox"/> Tires</li> <li><input type="checkbox"/> Appliances</li> <li><input type="checkbox"/> Glass bunkers or rolloff pad</li> </ul> <input type="checkbox"/> Operator lines of sight <input type="checkbox"/> Accessible for handicapped residents
Safety	<input type="checkbox"/> Facility fenced <input type="checkbox"/> Residents separated from processing areas and equipment <input type="checkbox"/> Pedestrian crossing of traffic lanes minimized or eliminated <input type="checkbox"/> Handrails as necessary <input type="checkbox"/> Clear, abundant signs <input type="checkbox"/> Ice and rain runoff from building roofs and from the site is a major design consideration

## WORKSHEET 2

### SITE, BUILDING, AND OPERATIONS PLANNING AND DESIGN CHECKLIST

DESIGN AREA	DESIGN/OPERATING CONSIDERATION
<b>BUILDING DESIGN</b>	
Materials Flow	<input type="checkbox"/> Convenient dropoff points for residents <input type="checkbox"/> Materials flow minimizes handling requirements (eliminate double handling, backtracking, etc.)
Layout	<input type="checkbox"/> Convenient, unambiguous for all residents including the handicapped <input type="checkbox"/> Convenient, safe for operators <input type="checkbox"/> Maximizes one-way material flow from dropoff, through processing, storage, and loading for shipment <input type="checkbox"/> Uses existing changes in elevation to minimize lifting and handling <input type="checkbox"/> Loading dock sufficient for volume of materials shipped and planned means of transport <input type="checkbox"/> Good interior and exterior access to loading dock
Processing Space	<input type="checkbox"/> Need for secondary sort of all materials accounted for <input type="checkbox"/> Adequate space for all processing operations (secondary sorting, baler operation, materials movement, etc.) <input type="checkbox"/> Clear access to baler <input type="checkbox"/> Ample space around all processing equipment <input type="checkbox"/> Ample space, clear lines of sight for all moving equipment <input type="checkbox"/> Possible future expansion taken into consideration
Storage Space	<input type="checkbox"/> Ample storage space for <b>ALL</b> materials <input type="checkbox"/> Storage plans account for special material requirements (e.g., textiles kept dry, fibers kept dry and out of sun, etc.) <input type="checkbox"/> Heated indoor storage used only as necessary (e.g., fibers); inexpensive outdoor storage used whenever possible <input type="checkbox"/> Adequate space and clearance for access by handling equipment (e.g., forklift, loader to glass bunkers, commercial packer truck deliveries, etc.) <input type="checkbox"/> Possible future expansion taken into consideration <input type="checkbox"/> Low-cost alternatives (e.g., road worthy and non road worthy trailers) considered
Future Expansion	<input type="checkbox"/> Possible future expansion considered in all aspects of building design
Safety	<input type="checkbox"/> Clear sight lines <input type="checkbox"/> Ample space around all equipment <input type="checkbox"/> Clear, unambiguous signs for operators and residents <input type="checkbox"/> Residents excluded from active processing areas

## WORKSHEET 2

### SITE, BUILDING, AND OPERATIONS PLANNING AND DESIGN CHECKLIST

DESIGN AREA	DESIGN/OPERATING CONSIDERATION
<b>OPERATIONS</b>	
Days and Hours	<div style="margin-bottom: 10px;"> <input type="checkbox"/> Most crowded days accounted for  <input type="checkbox"/> Adequate time for all residents (evenings, weekends, etc.)  <input type="checkbox"/> Adequate non-public time reserved for staff to process materials, maintain facility and equipment, etc. </div> <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <i>(Insert Hours)</i>  Monday Tuesday Wednesday Thursday Friday Saturday Sunday </div> <div style="text-align: center;"> Open To Public   _____   _____   _____   _____   _____   _____ </div> <div style="text-align: center;"> Open For Staff (Processing, etc.)   _____   _____   _____   _____   _____   _____ </div> </div>
Number of Operators	<div style="margin-bottom: 10px;"> <input type="checkbox"/> Enough operators scheduled for periods of maximum use  <input type="checkbox"/> Operators scheduled for adequate time for processing, maintenance, etc.  <input type="checkbox"/> Volunteer operators considered  <input type="checkbox"/> Special needs residents considered for some operations  <input type="checkbox"/> Welfare or “community service” residents considered for some operations </div> <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <i>(Insert Number of Operators Scheduled)</i>  Monday Tuesday Wednesday Thursday Friday Saturday Sunday _____ </div> <div style="text-align: center;"> Supervisor   _____   _____   _____   _____   _____   _____ </div> <div style="text-align: center;"> Regular   _____   _____   _____   _____   _____   _____ </div> <div style="text-align: center;"> Volunteer   _____   _____   _____   _____   _____   _____ </div> <div style="text-align: center;"> Special Need or Other   _____   _____   _____   _____   _____   _____ </div> </div>
Operations Manual	<input type="checkbox"/> Operations and safety manual completed
Operator Training	<input type="checkbox"/> Operator(s) have state certification as required <input type="checkbox"/> Operator(s) scheduled to attend state certification course <input type="checkbox"/> Annual operator training/recertification scheduled/attended <input type="checkbox"/> Operators trained in equipment use

DESIGN AREA	DESIGN/OPERATING CONSIDERATION
Record Keeping	<input type="checkbox"/> Personnel records (Hours, wages, benefits, etc.) <input type="checkbox"/> Trash hauling -- Tonnage, dates, cost, name of hauler <input type="checkbox"/> Trash disposal -- Tonnage, dates, cost, name of disposal facility <input type="checkbox"/> Recyclables -- Tonnage by material, market(s), dates shipped, payments received <input type="checkbox"/> Equipment maintenance
Safety	<input type="checkbox"/> Operations and safety manual completed <input type="checkbox"/> Operators trained in equipment use <input type="checkbox"/> Operators receive appropriate safety training <input type="checkbox"/> Equipment maintained properly and according to regular schedule <input type="checkbox"/> Protective devices and cutoffs installed and operating <input type="checkbox"/> Floors clean, dry, and debris free <input type="checkbox"/> Materials stored safely and away from public areas <input type="checkbox"/> Materials handled, stored to minimize manual lifting <input type="checkbox"/> Exterior driveways clear of debris <input type="checkbox"/> Passageways clear of debris and other blockage <input type="checkbox"/> Residents separated from operating machinery <input type="checkbox"/> Machinery operated as much as possible only when facility closed to residents <input type="checkbox"/> The following should be available to operators: gloves, safety glasses, eye wash station, running water, fire extinguishers, telephone or radio, and emergency numbers
Aesthetics	<input type="checkbox"/> Regular building and site cleanup scheduled and performed <input type="checkbox"/> Use municipal compost on-site <input type="checkbox"/> Use shrubs, trees, and plants as buffers from the wind and to beautify the site

### WORKSHEET 3

#### ESTIMATING TRANSFER STATION CAPITAL AND OPERATING COSTS

##### I. Land Cost:

$$\frac{\text{_____}}{\text{Acres}} \times \frac{\text{_____}}{\$/\text{acre}} = \$ \frac{\text{_____}}{\text{Total land cost}}$$

##### II. Site Preparation Cost:

Engineering/Design Cost = \$ \_\_\_\_\_

Permit costs = \$ \_\_\_\_\_

Site preparation costs (earthmoving, etc.) = \$ \_\_\_\_\_

Ramp and retaining wall costs = \$ \_\_\_\_\_

Loading docks costs = \$ \_\_\_\_\_

Driveway and parking lot costs = \$ \_\_\_\_\_

Fencing and gate costs = \$ \_\_\_\_\_

Fill material = \$ \_\_\_\_\_

Bring power to site = \$ \_\_\_\_\_

Septic system = \$ \_\_\_\_\_

Water supply system = \$ \_\_\_\_\_

**TOTAL COST** = \$ \_\_\_\_\_

##### III. Building and equipment cost:

Building cost = \$ \_\_\_\_\_

Trailer cost = \$ \_\_\_\_\_

Compactor cost = \$ \_\_\_\_\_

Hopper & chute cost = \$ \_\_\_\_\_

Rolloff container costs = \$ \_\_\_\_\_

Baler cost = \$ \_\_\_\_\_

Other equipment (Bobcat, etc.) = \$ \_\_\_\_\_

**TOTAL COST** = \$ \_\_\_\_\_

##### IV. Total Estimated Capital Cost:

Land Cost	=	\$ _____
Site Preparation total cost	=	\$ _____
Building and equipment total cost	=	\$ _____
<b>TOTAL ESTIMATED CAPITAL COST</b>	=	\$ _____

TOTAL ESTIMATED CAPITAL COST - Capital Cost Paid For Out of Pocket = Capital Cost to be financed. The amount of capital cost financed, depending on interest and length of bond, becomes the annual debt service.

### ESTIMATING TRANSFER STATION ANNUAL OPERATING COSTS

#### I. Labor Cost:

_____	X	\$ _____	=	\$ _____
Number of operators		Hourly wage rate		Total operator salaries
Hours per year				
\$ _____	X	(percentage) _____	=	\$ _____
Total operator salaries		Administration cost		Total administration cost
\$ _____		\$ _____	=	\$ _____
Total operator salaries	+	Total administration cost		Total labor cost
\$ _____		(percentage) _____	=	\$ _____
Total labor cost	X	Fringe benefit rate		Total fringe benefit cost
\$ _____		\$ _____	=	\$ _____
Total labor cost	+	Fringe benefit cost		<b>Total annual labor cost</b>

#### II. Utilities Cost (Annual):

Electricity	=	\$ _____
Gas	=	\$ _____
Oil	=	\$ _____
Propane	=	\$ _____

Telephone = \$ \_\_\_\_\_

**TOTAL ANNUAL UTILITY COST** = \$ \_\_\_\_\_

III. Tipping Cost:

Tons of \*Residential Solid Waste Per Year X Tipping Fee = \$ \_\_\_\_\_

Tons of C&D and Bulky Items Per Year X Tipping Fee = \$ \_\_\_\_\_

**TOTAL ANNUAL TIPPING FEE** = \$ \_\_\_\_\_

\*Tonnages can be determined by a solid waste analysis, using figures from similar size towns, and obtaining waste generation estimates from DES.

IV. Hauling Cost

\_\_\_\_\_ X \$ \_\_\_\_\_ = \$ \_\_\_\_\_  
Total annual Transfer truck operating  
transfer miles costs per mile (fuel &  
maintenance) Transfer truck  
operating costs

\_\_\_\_\_ X \$ \_\_\_\_\_ = \$ \_\_\_\_\_  
Total annual Transfer trailer operating  
transfer miles costs per mile Transfer trailer  
operating costs

Tons of Residential Solid Waste/ X (\$ \_\_\_\_\_ + \$ \_\_\_\_\_) =  
Tons of C&D and Bulky Waste Transfer truck Transfer trailer  
operating costs operating costs

**TOTAL ANNUAL HAULING FEE** = \$ \_\_\_\_\_

Or

Contract Hauling Fee = \$ \_\_\_\_\_

V. Maintenance:

Annual Maintenance Cost = \$ \_\_\_\_\_

VI. Rental Equipment Cost:

Annual Rental Equipment Cost = \$ \_\_\_\_\_

VII. Insurance Cost: = \$ \_\_\_\_\_  
(Liability, automobile and equipment, fire, theft)

VIII. Total Annual Operating Cost:

Total Annual Labor Cost = \$ \_\_\_\_\_

Total Annual Utility Cost = \$ \_\_\_\_\_

Total Annual Maintenance Cost = \$ \_\_\_\_\_

Total Annual Equipment Rental Cost = \$ \_\_\_\_\_

Total Annual Tipping Fee = \$ \_\_\_\_\_

Total Annual Hauling Fee = \$ \_\_\_\_\_

Total Annual Insurance Cost = \$ \_\_\_\_\_

**TOTAL ANNUAL OPERATING COST** = \$ \_\_\_\_\_

IX. Revenues (Monies collected for tires, refrigerators, C&D, bulky waste, etc.)

Tires = \$ \_\_\_\_\_

Refrigerators = \$ \_\_\_\_\_

C&D = \$ \_\_\_\_\_

Bulky waste = \$ \_\_\_\_\_

Commercial waste = \$ \_\_\_\_\_

Other = \$ \_\_\_\_\_

The monies collected should cover the actual cost of processing or disposal of these items. The revenues received may be placed in the general fund or placed in a separate fund to reduce the operating costs.

Note: Calculating the revenue from recyclables is near impossible as the markets fluctuate greatly over time. It is probably best not to include recyclable income in your operating costs because of this fluctuation.

